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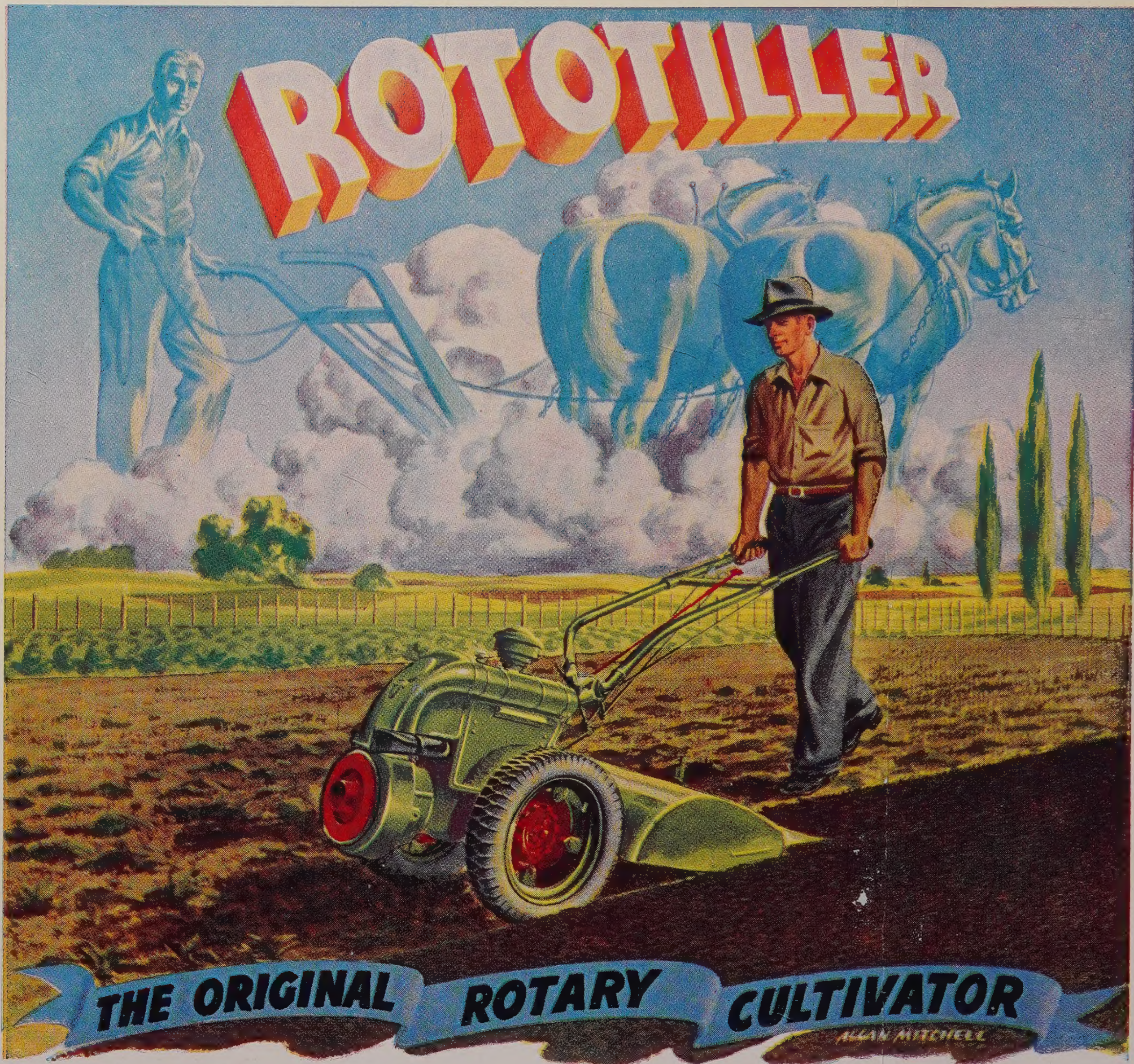
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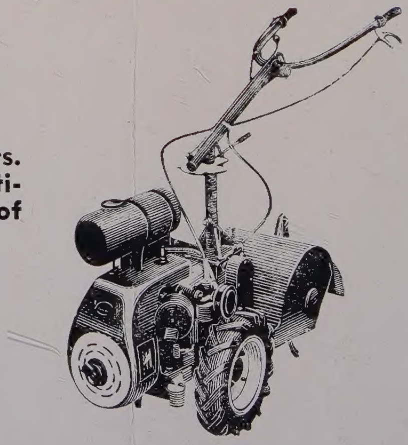

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This Month's Cover

A pastoral scene in the Buller Gorge country, one of the many notable scenic attractions of the west coast of the South Island, is the subject of this month's cover, which has been reproduced from a Flexichrome (Kodak (N.Z.) Ltd.) print by L. Cutten of a photograph by National Publicity Studios. Much of Buller County is still unoccupied, but the area contains New Zealand's biggest fields of steam coal. Dairy farming, though not extensive, is important because on it depends the supply of milk for centres such as Westport and the mining towns. The two butter factories in the county have a combined output of about 650 tons a year.

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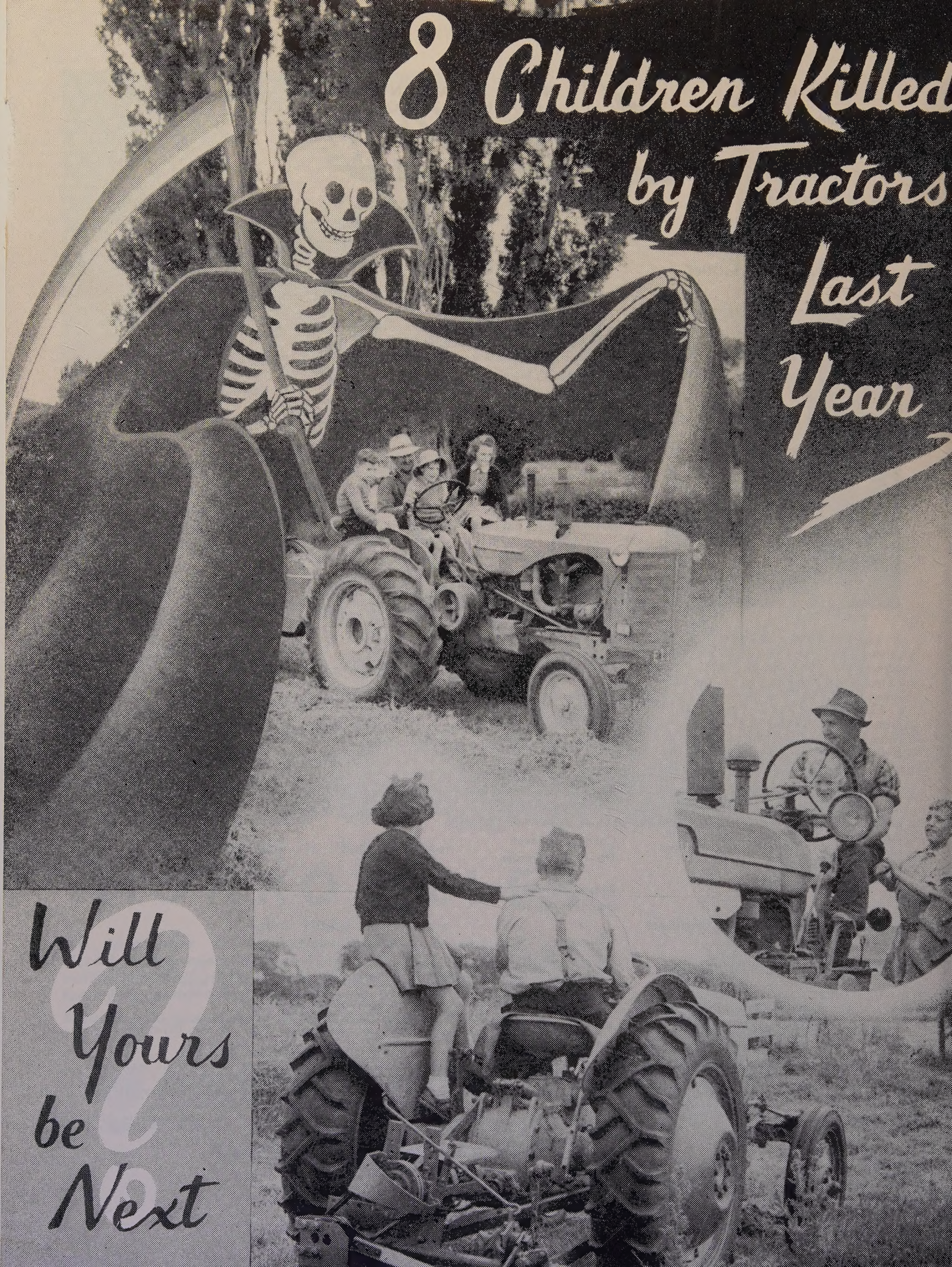

8 Children Killed
by Tractors
Last
Year
Will
Yours
be
Next
?

Dangers of Permitting Children on Tractors

I WAS deeply shocked to read in the newspapers on two consecutive days between last Christmas and the New Year of the tragic deaths of two children who fell off farm tractors and were killed by the machines drawn by the tractors. These two sad happenings brought the number of farm children killed in 1952 by tractors, their associated implements, or both to the distressing total of 8—nearly one-third of the record total of 26 persons killed by farm tractors last year.

That the number of tractor fatalities has increased markedly in the post-war years is in itself alarming and is in part due to the increased number of tractors at work and the present trend of land development in the steeper parts of New Zealand not previously cultivated. But the fact that eight children lost their lives last year is a terrible thing and deserves immediate attention by all in charge of farm tractors.

How Fatalities Occurred

Let us consider the facts of these sad fatalities. A boy 13 years old was riding on a tractor-mounted mower when his overcoat became caught in the unprotected power take-off shaft and he was pulled under the mower and killed. A boy 3¼ years old fell off a tractor on which he was riding and a 10-ton roller passed over him. A 2-year-old child who had climbed on to a stationary tractor fell off when the tractor moved backward and a rear wheel crushed him. When a tractor being overhauled slipped off its jacks it fell on a 22-months-old boy and killed him. A 5-year-old girl (one of four children riding on a tractor) fell off in the path of a rotary mower and was killed. When a 9-year-old boy fell off a tractor the wheel of a hay baler passed over him and crushed him. A girl 4 years old ran in front of a tractor-drawn field roller and was killed and an 11-year-old boy was badly gashed in the leg by a set of tractor-drawn discs and died from loss of blood and shock.

Grave Negligence

It is quite evident that most of these children met their deaths as a result of almost criminal negligence on the part of tractor drivers in allowing them on the tractors in the first instance and secondly in not taking proper care of them when they were on the machines. It must be recognised that the farm tractor is not a passenger-carrying vehicle.

With one exception tractors at work in New Zealand are built to seat one person—the driver—and to allow others on the tractor is to expose them to a very real danger. To carry children on tractors is to expose them to dangers over which they have no control. They have not the experience or strength to protect themselves if an emergency occurs and the tractor driver is too engrossed in controlling his machine to protect them even though they are near him. To allow children to ride on a tractor or its associated implements in a position where the driver cannot reach them is folly in the worst degree and an example of a carelessness that must not be tolerated in the future.

Tractors Potentially Dangerous

I recognise that this is a mechanical age and that children are brought up in an atmosphere of mechanical things. A toy tractor is often among the first playthings they are given and it is natural for them to want to ask on the first opportunity for a ride on the real thing. However, it must now be evident to all that the tractor is the most dangerous machine on the farm. It was directly or indirectly the cause of the death of nearly half of the 19 children who lost their lives in farm accidents last year. So I ask all drivers of farm tractors to refuse such requests in the future, for only in this way will we reduce the terrible toll tractors are taking of our farm children. They are too precious to lose in this way.

A driver of a vehicle on the road is breaking the law if he allows a child on his knee. There are ample reasons why the law should prohibit this, but drivers of tractors on farms can, and unfortunately do, accept the risks inherent in such a practice. The competent operation of a tractor, particularly with certain types of attached implements, demands constant alertness and the driver cannot afford to have his attention divided between the controls and young passengers.

Responsibility rests, too, on those in charge of young children on farms, particularly visitors. A driver concentrating on the backing of a tractor from a shed or on manipulating it during field operations often may not be able to hear children approaching or even perhaps to see them before they are in a dangerous position. I would suggest to parents that it would be best to keep young children well away from tractors; certainly they should not be allowed to approach a tractor working where the driver may not be able to see them from a distance or where the driver has no knowledge that they are about.

As a father and as a practical farmer, I endorse heartily the work officers of my Department are doing in the tractor and farm safety campaign and I recommend strongly that all farmers (particularly those with young children), contractors, and any who assist with tractor work should strive to put what is being advocated into practice.

K. J. HOLYOAKE, Minister of Agriculture.

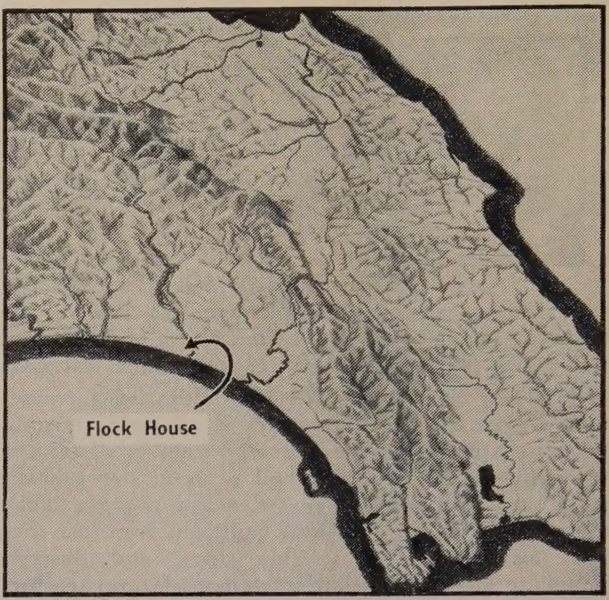
Opposite—The Department of Agriculture gratefully acknowledges the co-operation of those who posed to simulate circumstances under which tragic accidents to children have occurred. Photographs by Standish and Preece.

V Drainage on Sand Country at Flock House Farm of Instruction

SOME 280,000 acres of coastal sand country lie beween Paraparaumu and Patea on the west coast of the North Island. The depth of sand dune country ranges from 1 to 2 miles up to 10 miles in places, with an average depth of some 4 to 5 miles. Throughout this area lie wet sand plains totalling approximately 150,000 acres which can be benefited by the provision of a special type of open drain. Drainage on these areas is impeded either as a result of a high natural water-table or because no outlet is available through the sand ridges which encircle and divide the wet flats. In this article by E. W. S. Wilson, Farm Drainage Officer, Department of Agriculture, Palmerston North, in the series on developing sand country at Flock House Farm of Instruction, V drainage on the farm is dealt with. The concluding article will discuss training on the farm.

THE conventional type of open drain with battered or straight sides is readily trampled down by stock and requires constant and costly maintenance by hand. Mechanisation has made it possible to construct broad, shallow V drains, which, when successfully grassed, require little or no maintenance.

Whereas open drains through a paddock restrict normal farm operations, properly constructed V drains are easily negotiable by farm implements and tractors.



[From a map prepared by the Education Department.

Planning Sand-country Drainage

Where such work is required it is necessary to strike a balance between lowering the water-table sufficiently to enable ryegrass and white clover to thrive and yet maintain it at a level consistent with the moisture requirements of the sward.

The problem of over-drainage of sand country is a very real one. Before any major drainage scheme is begun a detailed and comprehensive survey should be made of the area. From an analysis of such data the location of the outlet and the position and gradient of the internal scheme can be planned.

Gradients of V Drains

The natural fall in the sand country on Flock House Farm of Instruction varies considerably. The information presented in this article is as a result of observations made of a considerable amount of drainage work carried out as an integral part of the land development work at Flock House during recent years.

The optimum gradient appears to be 1ft. in 500ft. However, much of the wet country consists of rather long narrow strips of wet land lying between sand ridges or fairly localised areas which require to be linked up.

Because of the necessity to maintain the water level within 2ft. of the

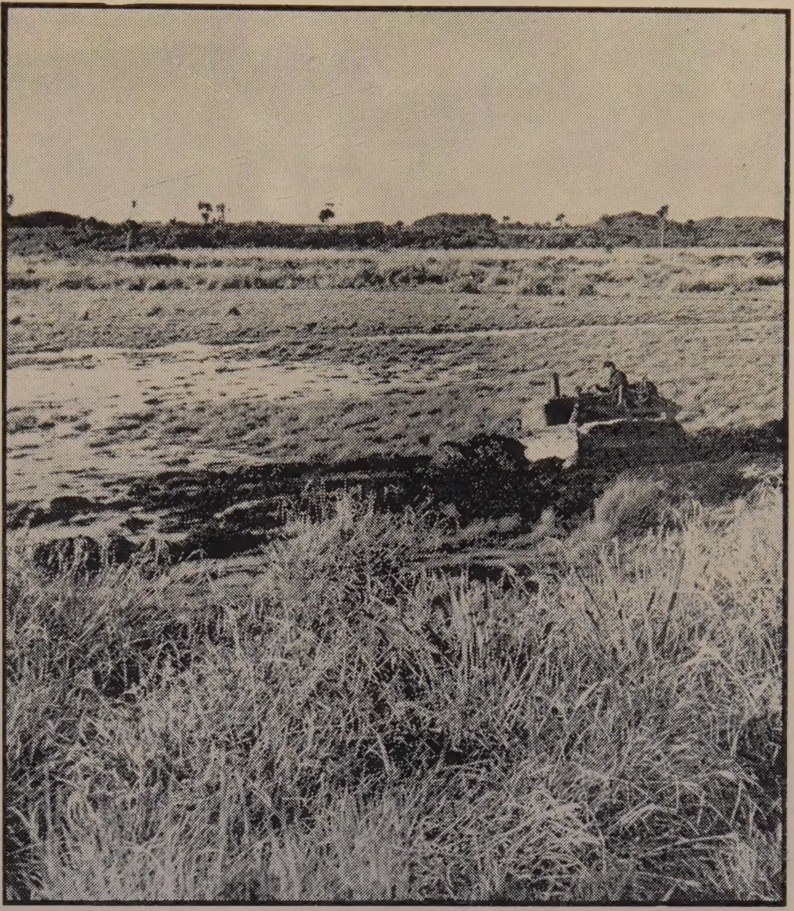
BELOW: Undrained sand country.

surface as far as possible, gradients require to be much flatter than previously mentioned. A V drain with a gradient of 1ft. in 500ft. has functioned very successfully. At 1ft. in 2000ft. results have been satisfactory, but a tendency for the water to remain for long periods in the bottom of the drain has resulted in the ingress of undesirable species. This has also been so where V drains have been bulldozed on a level grade. Though the advantage of having no upkeep is partly lost, the maintenance required can readily be carried out by the use of a light blade.

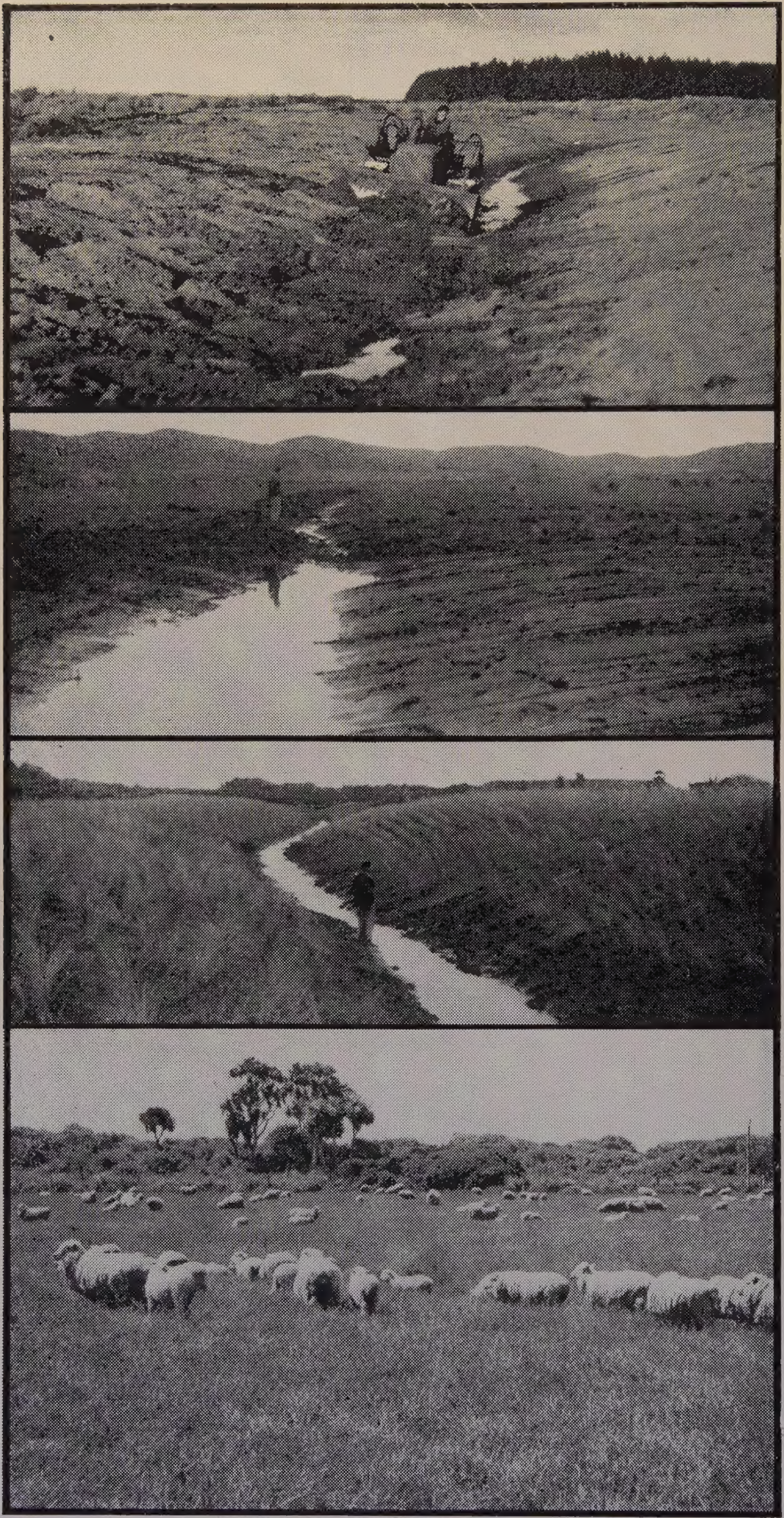
A difference in relative height above sea level of the wet flats may mean that the drainage water requires to be conveyed safely down a fairly steep grade from one V drain to another. The use of a broad, shallow grassed runway with a gradient of 1ft. in 200ft. has proved ideal. Where the preliminary survey has shown the need for such a waterway consideration should be given to its installation at least a year before it is required to carry drainage water.

Preparation of Outlets

The provision of a satisfactory outlet to a wet flat may mean, as mentioned previously, excavating a V drain through sand ridges. Maintenance of this outlet so that it may function successfully is of the greatest importance if good drainage of the area lying behind the cut is to be maintained. Stabilisation of the raw sand which is exposed is essential. Though ryegrass and white clover will strike readily and persist up to the height of the water-table, it has been found that marram grass is the most useful plant for covering the raw sand. Lupin, common wherever there is sandy soil, is also valuable in obtaining a quick cover over the disturbed sand. After the initial settling doub (*Cynodon dactylon*) has proved to be an excellent grass, giving a very close cover. Because fencing is necessary to keep stock out of



Above—A portion of an extensive wet flat lying between sandhills. Below—Development of the area illustrated above, showing a grassed V drain.



Top—Developing an outlet through low sandhills for the drainage of an enclosed wet sand flat. Upper middle—Partly completed V drain being opened up through heavy sand country. Lower middle—Stabilisation effected by planting marram grass and sowing lupin on sides of major cut through low sandhills. Bottom—Grassed over V drain which has become part of the paddock.

areas where major cuts have been made, the opportunity exists to plant pine trees (*Pinus radiata* or *Pinus muricata*). Apart from providing shelter, they will eventually close over the drain, making a canopy which will exclude light, thereby reducing maintenance to a minimum. Care should be taken when planting the trees, however, to do so well up the sides of the cut to permit mechanical cleaning of the drain until the trees become sufficiently well established to fulfil their purpose.

Side Slopes of V Drains

Experience has shown that where cuts have been made through sand hills, provided they are well planted, stability is good with a maximum gradient of 1 in 3.

V drains through the open paddock, however, require to be battered down to 1 : 7 or 1 : 10 to permit ease of crossing at any point. The excavated material requires to be spread well out from the V drain; otherwise a high ridge is formed along each side of the channel, restricting the flow of surface water. Again, a depth of more than 6in. to 9in. of spread material makes subsequent cultivations difficult.

Method and Timing of Operations

The bulldozing work carried out in the formation of a considerable chainage of V drains at Flock House has been done by a highly skilled operator. Because of the influence of the personal factor, comparative costs are difficult to estimate.

The method used, however, has been to angle one side out in part and complete the job by working at right angles to the line of V drain. Where possible V-drainage work on wet sand country should be carried out early enough to permit sowing to grass and clover early in autumn. Often, however, it will not be possible to sow the bottom of the drains until the following autumn because of the draw-off of surplus water in the area. A light discing followed by a stroke of the harrow should be sufficient to prepare a suitable seed-bed in the bottom of the drain. Strawberry clover is an ideal plant for the bottoms of V drains which are likely to carry water for some considerable time.

Intensity of Surface Drainage

The drainage requirements of wet sand areas vary considerably. A V drain through localised wet spots will be all that is required on the lighter wet country. Where the flats are of a heavy, peaty-sandy loam, more intensive shallow surface drainage is required. However, it is suggested that ploughing at an angle to the main outlet V drain, in narrow lands, is one method of accomplishing better drainage without incurring any increased costs. The use of a light blade should permit the final touches to be put to the finishes and carry them through to the outlet V drain.

Attention to drainage is as important on sand country requiring it as it is on any other soil type. But because it may be done with less specialised equipment than is necessary for other types of drainage, farmers on sand country may more readily do the work themselves or use the equipment and services of local contractors.

Liquefying Granulated Honey

OF the numerous ways of liquefying granulated honey two of the best known and most widely practised safe methods are outlined in this article by L. H. Johnson, Apiary Instructor, Department of Agriculture, Palmerston North. Although liquefying honey for repacking is an addition to the cost of production, it appears to be necessary in some districts.

WHEN a heavy honey flow is on and extracting is in full swing many commercial beekeepers find it an advantage to store liquid honey in 60lb. tins and later when it has granulated to reliquefy it and pack it into retail containers. Unless a beekeeper has a small refrigeration unit to operate a cooling room, it would not be sound practice to pack freshly extracted honey into retail containers during warm weather, as it is likely to granulate with a coarse grain. Another factor to be considered is the variation of colours and flavours of honey. These variations can be assessed during the extracting period and later the honey can be skilfully blended and packed into retail containers when the weather is cool. It would appear that as the honey market is likely to become more competitive, many beekeepers will have to pay more attention to blending and graining of their honey if they intend supplying the local market direct.

Honey, after leaving the extractor, should be run through a wire gauze strainer before it enters the honey tank. Although not a complete straining, this will keep back most of the particles of wax and other foreign substances. When the tank or tanks are full honey may then be run off into 60lb. tins and sealed and left until all the extracting is finished.

Reliquefying

Liquid honey left for a few weeks will be in some stage of granulation and will need to be brought back to its original condition for processing, blending, and packing. The simplest and most common method of melting honey used for many years by individual beekeepers has been simply to stand the containers with honey in a tank or vat nearly full of water kept hot for several hours by a fire or steam or electric power. Water is a convenient medium for an even distribution of heat without hot spots or burning.

A system much in vogue requires the use of a large vat made of galvanised iron or of concrete, the inside dimensions of which are 4ft. x 9ft. x 1ft. 5in. This will take forty 60lb. tins aggregating about a ton of honey. The tins of honey are set on 8 strips of 1in. by 1in. timber on the bottom of the tank and are placed about 1in. apart. Water is run into the tank until it reaches to within about 2in. of the tops of the tins. The water is then heated with steam generated by a boiler and conveyed by piping. The tin lids are left on loosely, but care must be taken not to let any added moisture get into the honey.

Steam Boilers

The installation of a steam boiler in a honey house may be expensive, but because there are so many uses for steam, the outlay generally appears to be a wise investment. Several types of boilers have been used successfully, of which two types are illustrated on this page. The vertical high-pressure boiler has no tubes and may be called a life-time job. It can be fired with wood or coke and is economical to operate. The under-fired multi-tubular boiler is a well-known type and is very satisfactory. Another small high-pressure boiler often used is the vertical multi-tubular type. As pressure is required to operate the steam injector for filling a boiler, most boilers are run at 45lb. pressure or more. Less pressure would supply sufficient steam to heat water for liquefying honey. Other designs of oil-burning low-pressure boilers are quite satisfactory.

Controlling Heat for Liquefying

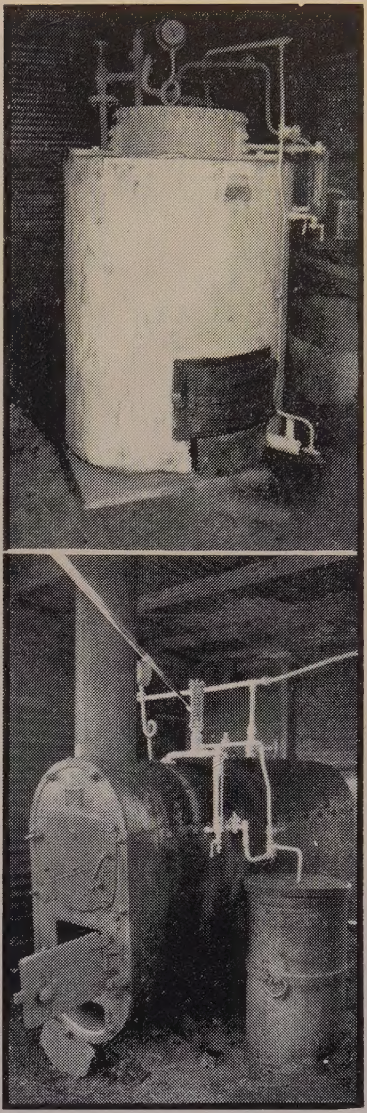
The maximum temperature to which honey may safely be heated is 160 degrees F. and that only for a very short period. Overheated honey is darkened and the flavour is impaired; also it loses much of its brightness when it granulates later. Any prolonged heating may be detrimental to honey. Temperatures below 140 degrees F. may not effectively break up all the crystals within a reasonable time.

It does not seem practical to control the pressure of steam or the temperature of the water automatically. The safest plan is to check the temperature of the water with a thermometer at intervals and not let it rise above 160 degrees F. With a little experience the beekeeper can set the steam cock to admit the steam required to keep the water at about the right temperature.

As the honey becomes liquid it should be agitated slightly to hasten the process and to prevent any possible overheating at the outer edges until all crystals are thoroughly melted. If an early start is made in the morning, the honey should all be melted the same day. The stage has now been reached where the honey is liquid in the tins.

Heating Water by Electricity

A very satisfactory method of supplying heat for this job is by electric power. A length of flex leading from a power point and connected to two electric immersion heaters each of 2000 watts should supply all the heat necessary. An element should be placed at each end of the tank and controlled by a thermostat, which should be set at 160 degrees F. To prevent loss of heat the tank may be insulated on all sides with sheets of wood pulp softboard. As the control of heat is automatic, the tank may be left unattended for hours. Installations of this nature should be done by a registered electrician.

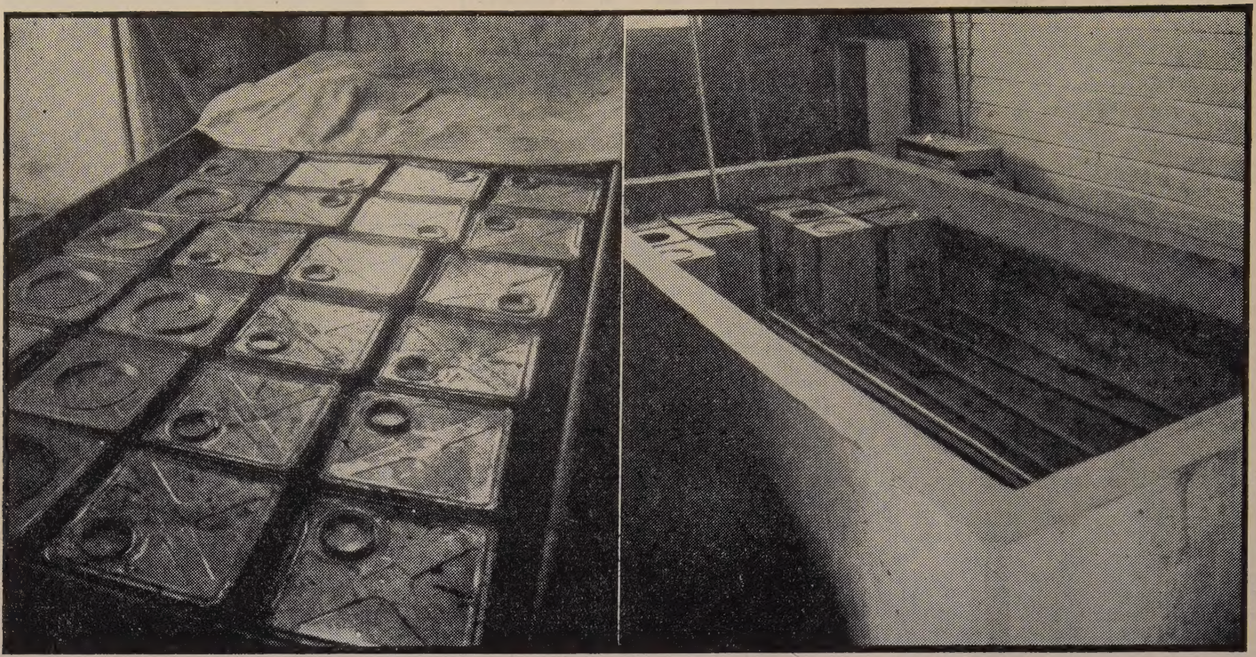


Upper—Vertical high-pressure boiler without tubes. Lower—Under-fired multi-tubular high-pressure boiler.

Transference of Honey from Tins to Tanks

To transfer honey from the tins to tanks a shallow tank (to hold ½ ton) should be placed on the floor alongside the melting tank. The hot water may be drained off and the tins of honey lifted out of the vat and poured into this small tank from whence honey is pumped to the tanks on a higher level in the packing room. There does not appear to be any way of draining all the honey out of the tins through the usual openings. However, practically all the honey may be recovered by the following method.

After all the tins have been emptied in the usual way they should be stood right end up on a rack with a two-way fall so that all the honey will drain



Left—Portable galvanised-iron hot-water vat holding 40 tins. Right—Concrete tank, showing steam pipe on the bottom, strips of wood to stand the tins on, tins in position, and the water mark when the tank is filled. This tank is not portable.

down to one corner at the bottom. When drainage is complete the honey may be sucked out of each tin with a large syringe fitted with an extension nozzle.

Using a Cappings Melter

Liquefying honey may be done effectively by using a hot-water jacketed cappings melter. After the screw caps or lever lids on the honey tins have been removed the containers may be placed upside down or on their sides in the melter and the lid closed. The water in this type of melter is usually heated by an electric element and controlled by a thermostat, which may be set at 160 degrees F. Honey nearest the tins on the outside of the mass will melt first and drain out on the bottom of the melter and then out through the open gate into a honey tank. Liquid honey is not subjected to prolonged maximum heat, but will usually retain sufficient heat in the tank to dissolve any remaining crystals. Melters that will hold twelve 60lb. tins at each melting will make a very satisfactory job of liquefying, but are not large enough to handle several tons of honey quickly.

Straining and Settling

Honey is easy to blend and strain either as it enters the small tank or the main tanks. Honey left in the tanks overnight will have clarified and will still be warm in the morning. After all froth and unnecessary particles have been skimmed off the honey is ready to be seeded and packed in containers.

Protecting Tins from Rusting

As 60lb. tins are valuable, they should be coated on the outside with lacquer, boiled linseed oil, or water-resisting varnish when they are new to prevent them rusting because of the contact with water. Rain-water used in the liquefying tank is preferable to ground water which contains iron and other minerals. The large vats three-parts full of water and heated by the previously described methods may be made good use of to wash the 60lb. tins after use. The water left in the tins, like the honey, may be removed with the syringe.

Although liquefying honey for repacking is an addition to the cost of production, it appears to be necessary in some districts. Some of the advantages, which are summarised, could not be obtained without it:—

Storing honey first in bulk containers and later melting it for packing allows the beekeeper more valuable time to concentrate on extracting during warm weather.

Honeys derived from a great variety of floral sources when heated and blended will remain constant.

Yeasts that may be present in the honey are destroyed, thus adding to its keeping qualities.

When all crystals which may first have been in the combs are dissolved and the honey is reseeded and packed during colder weather a smooth, uniform grain is secured.

The Journal of the British Grassland Society

Editor: Professor H. I. Moore

This Journal is a medium for the publication of the results of research and practical experience in the realm of Grassland Husbandry.

Contents of Volume VII, No. 3, 1952

1. The Output of Pasture and its Measurement — P. A. Linehan, J. Lowe and R. H. Stewart
2. Classification and Improvement of Mountain Pastures in Italy — W. T. White
3. The use of Fertilisers on Herbage Cut for Conservation. Part 1 — T. W. Walker, G. H. A. Edwards, A. J. Cavell and T. M. Rose

This Journal is published quarterly. Subscription Vol. 1 15/-; Annual Subscription thereafter, 30/- per volume. Orders to:—**The Secretary, British Grassland Society, 69 May Street, Belfast, Northern Ireland.**

Utilisation of Organic Wastes

The second interim report of the Inter-Departmental Committee on the Utilisation of Organic Wastes has been reprinted.

The report has a general survey of available organic wastes and comprehensive sections on composting and the treatment of sewage sludge, including practices and results in both processes in overseas countries.

A limited number of copies of the report can be obtained at 4s. 6d. per copy from the Ministry of Works, Box 8024, Government Buildings, Wellington. Remittances should be made payable to the Ministry of Works.

The Home Garden in April

A NEAT, well-kept home garden is a delight, but to a large extent any garden merely reflects the amount of work put into it. In the first part of this article, by B. G. Mills, Horticultural Instructor, Department of Agriculture, Wellington, some simple hints and gadgets which will save the home gardener time and expense are discussed. The section of the article on garden work for April is by C. L. Napier, Horticultural Instructor, Department of Agriculture, Hastings.

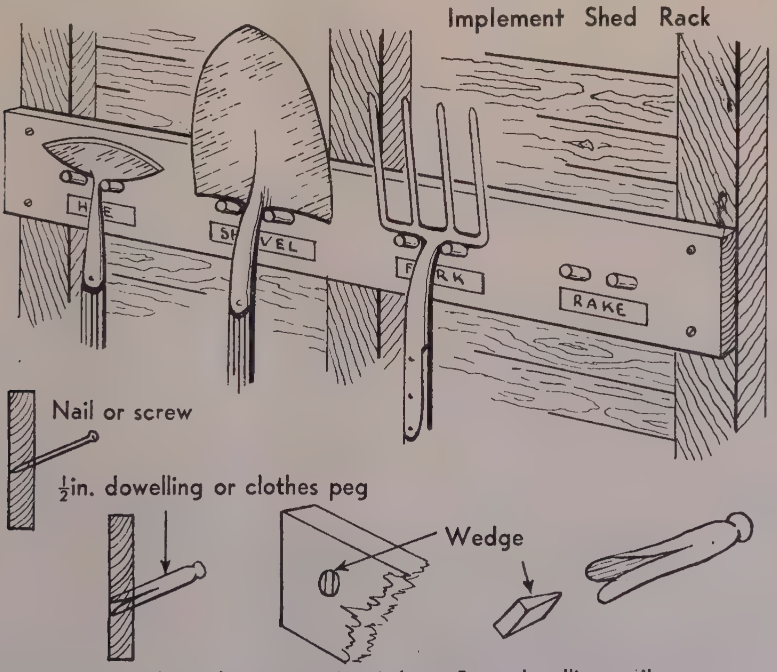
[*Sparrow Industrial Pictures Ltd. photo.*

MOST of the gadgets can be made by the average handyman from pieces of timber and metal. A few hours spent during winter in making a few of these items could save much time during the next gardening season.

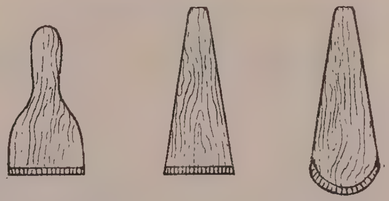
The implement shed: To save time and space the construction of a well-labelled tool rack will prove invaluable. A board firmly attached to the shed wall with stout wooden pegs, nails, or screws attached at the required spacings will provide sufficient support for most tools. Neat labels on the rack are very useful, as a glance will show what tools are missing. Such a rack as well as saving space and time gives a neat and orderly appearance to a shed. (See illustration below.)

Cleaning garden tools: Good tools are necessary for efficient working, and cleaning after use is most important to keep tools in good order and to prolong their life. An old brush, wooden scrapers, and dry sacking attached to a handle are useful for removing soil. Use of cotton cloth tied on a handle is a clean way of oiling tools. (See illustration at right below.)

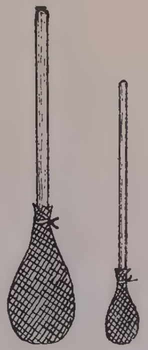
Home-made hand fork or cultivator: An old table fork is very useful for weeding seed-beds and boxes and for transplanting seedlings. A 3ft. length of No. 8 gauge steel wire can be made into a useful hand fork or cultivator. (See diagram at top left on page 202.)



The board for the rack is 4in. x 1in. timber. Pegs, dowelling, nails, or screws can be used for holding the tools.



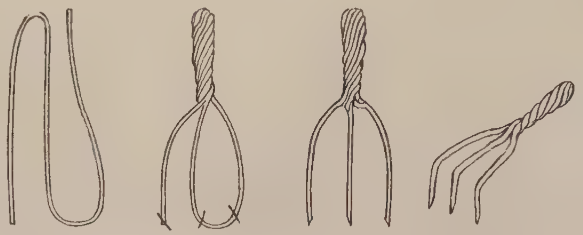
Keeping tools clean. Above—Hardwood shovel scrapers. Below—Dry, rough sacking on handle for removing dirt (left) and cotton cloth dipped in oil on handle for oiling tools.



Garden lines: A good-quality cord and strong stakes should be used for garden lines, but they may be fitted up in a number of ways. The usual method is to roll the line round one stake and attach the free end to another. It is a good idea to attach a strong rubber band to the free end of the line, as this will keep the line tight when it is stretched. A winding device such as an old fishing reel attached to the major peg will save time in rewinding. Two stout pegs or nails driven into a stake will form a good support on which to wind the line. (See diagrams at middle left on page 202.)

Garden dibbles: A very useful home-made tool is a dibble. These can be

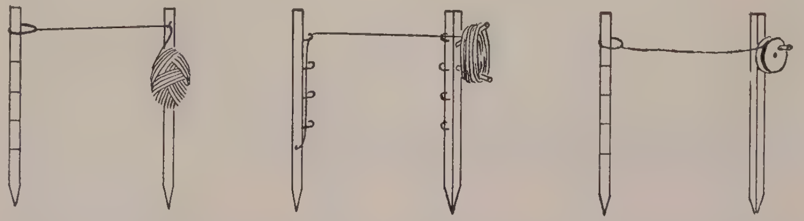
Hand Fork or Cultivator



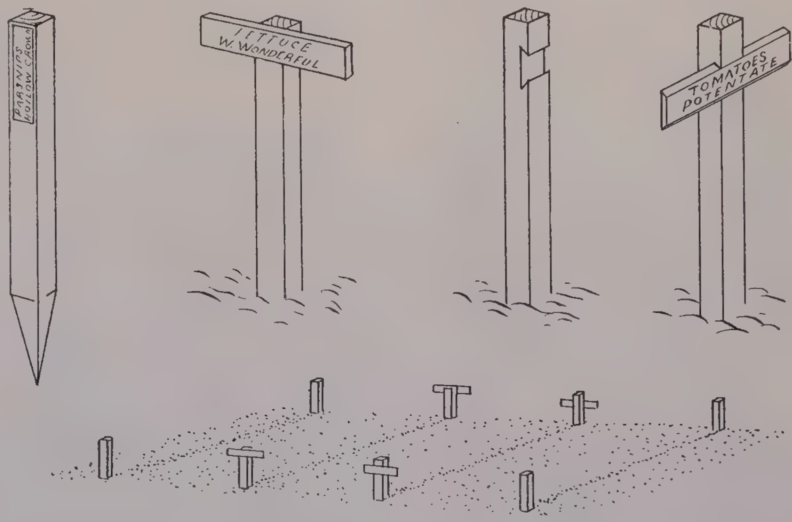
A 3ft. length of No. 8 or No. 10 wire is bent and cut as shown to make either a hand fork (third from left) or cultivator (extreme right).

Garden Lines

Methods of attaching garden lines to pegs, which should be about 2ft. long, painted, and marked off in suitable distances with painted lines or saw cuts. At left and right the free end of the line is attached to the stake with a rubber band. The middle line has bent nails or hooks attached to the pegs so that the height of the line on the pegs can be adjusted if it is not possible to press the pegs further into the ground. The cord on the middle line is coiled round angled pegs on the right-hand stake. An old fishing reel is used on the line at right.

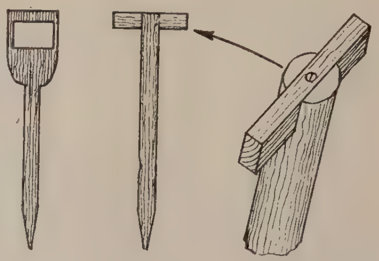


Garden Pegs



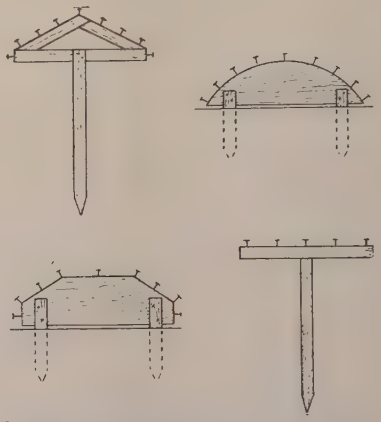
It is recommended that pegs should be of 1in. x 1in. timber 18in. or more long and painted white. Pegs can be labelled as shown; the label at right is removable. The groove in the peg to take it (third from left) should be 1in. or more from the top of the peg. The lower half of the diagram shows a well-laid-out and marked plot.

Garden Dibbles

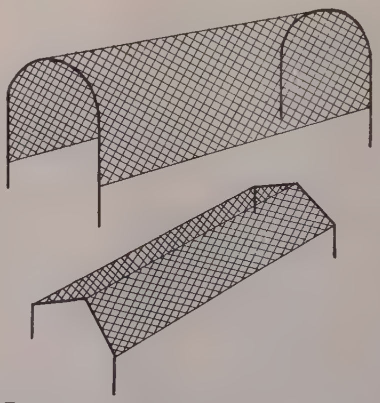


At right—Dibbles made from broken spade (left) and shovel (centre) handles. The diagram at right shows how to fit a hand grip to the shovel-handle type.

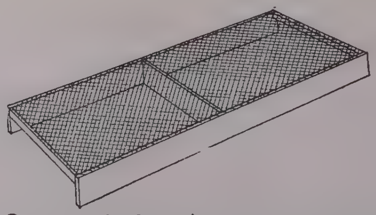
Devices to Protect Peas from Birds



Types of wooden supports for cotton over peas.

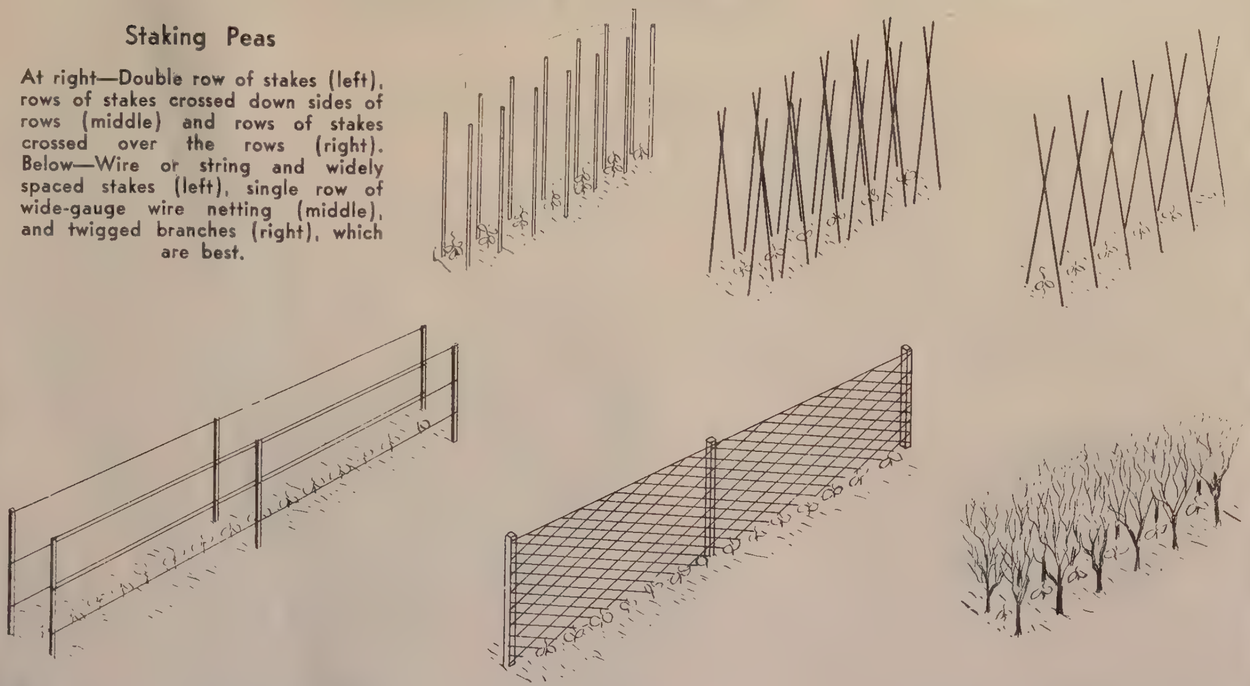


Two types of covers made from ½in. wire netting and No. 8 wire. The projecting wires are pushed into the soil.



Cover made from ½in. wire netting on frame of 4in. x ½in. timber. Frames should be 4ft. or more long.

Staking Peas



At right—Double row of stakes (left), rows of stakes crossed down sides of rows (middle) and rows of stakes crossed over the rows (right). Below—Wire or string and widely spaced stakes (left), single row of wide-gauge wire netting (middle), and twigged branches (right), which are best.

made readily from broken spade or shovel handles or from similar stakes (to which a suitable hand grip should be fitted) and are very useful for planting out leeks, etc. (See diagrams at top right on page 202.)

Pegs and labels for rows: After sowing seeds it is advisable to mark the rows with labelled pegs. Pegs should be painted to preserve them and make the names more legible. Several types of marking pegs are shown in the diagrams at bottom left on page 202.

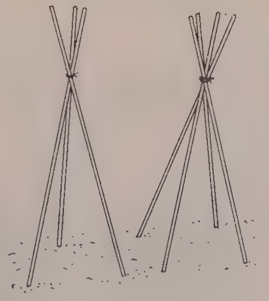
Protection from birds: Wire netting covers are very effective for protecting peas and strawberries from birds, but they can be expensive. Types of frames to use for netting covers are illustrated in the diagrams at lower right on page 202. An inexpensive and very effective method of protecting peas from birds is by the use of cotton strung over the rows. Simple gadgets made to hold the cotton are illustrated at right on page 202. A few 1in. nails driven into the board ends are sufficient to hold the cotton in place and make it easy to attach. The cotton can be cut at the ends and the end frames removed when the peas have developed beyond the stage when birds will attack them.

Soaking pea seed in kerosene or dusting it with red lead helps to deter birds. It is advisable to dust a fungicidal seed powder over peas before planting.

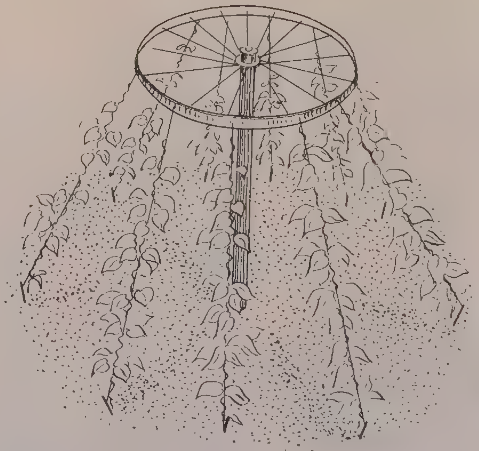
Soaking peas in water before planting is not a good practice, as the seed coats may be damaged when seed is handled and the protective dusts are removed. It is better if the soil is particularly dry to sow the seeds and then water the planted row.

Staking peas: Several methods of staking peas are shown in the diagrams above. The tendrils of the peas attach themselves to stakes, so the more twigs there are the better.

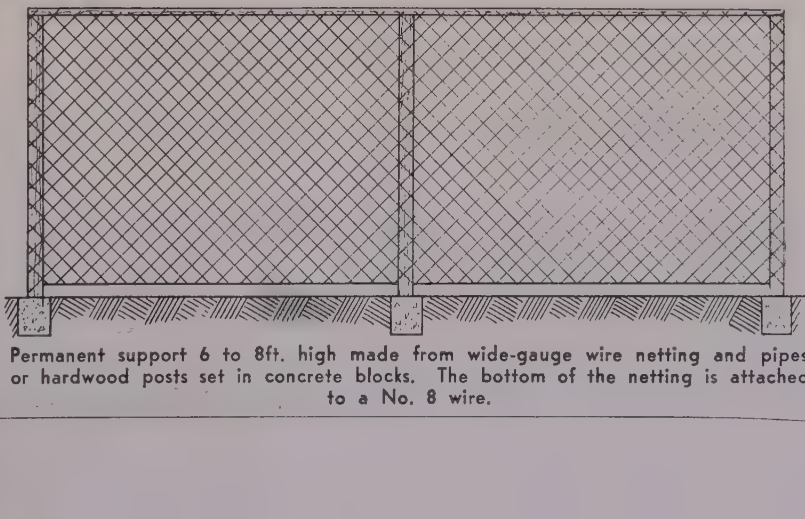
Supports for Runner Beans



Groups of 3 or 4 stakes 6 to 8ft. long.



Strings or wires suspended from old bicycle wheel attached to top of post.



Permanent support 6 to 8ft. high made from wide-gauge wire netting and pipes or hardwood posts set in concrete blocks. The bottom of the netting is attached to a No. 8 wire.

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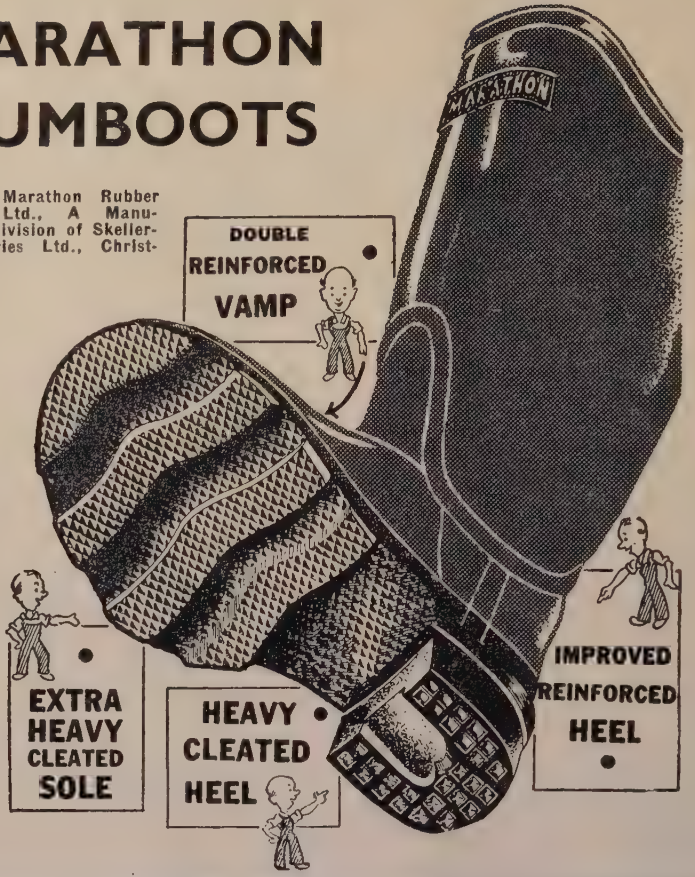
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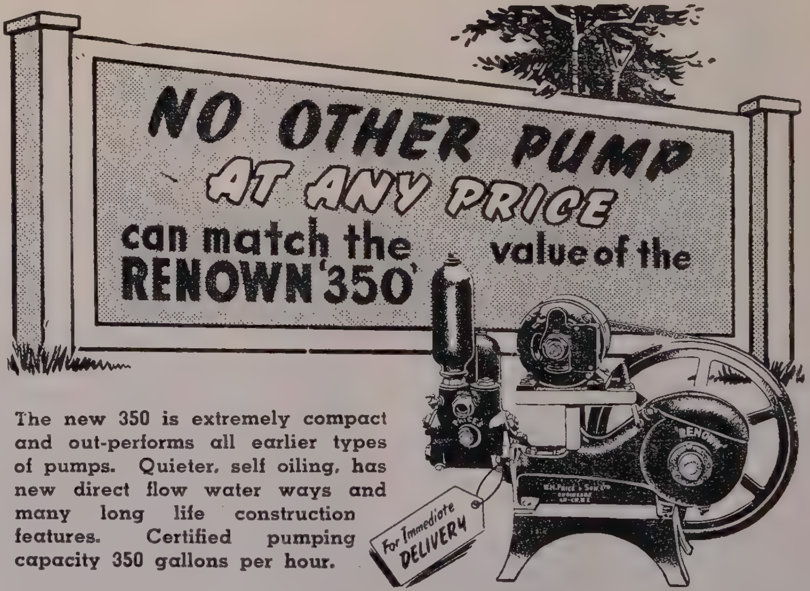
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Straight stakes are satisfactory, but are more efficient if they are crossed as shown in the diagram. More expensive methods are by the use of twine or wire netting as illustrated at the top of page 203.

Runner bean supports: When runner beans are grown as perennials in warmer districts a permanent support can save time and labour. Both soil and old bean tubers can be replaced when necessary. A wide-gauge wire netting should be used and sound posts or pipes used as supports. A good position for a bean fence is at the end of the garden, where it will take up less room and form a break-wind. Where winds are strong, however, it is better to set the rows in the direction of the prevailing wind to reduce damage.

For temporary supports wooden stakes can be used. Three or four stakes should be set in the form of a tent and tied securely at the top. The beans should be planted at the base of each stake.

A novel support for an odd corner is an old bicycle wheel secured to the top of a stout stake. Strings or wires suspended around the wheel form an excellent framework.

Ties for plants: Raffia, cotton materials, or old silk stockings cut into bands make satisfactory tying materials. Plants should be tied firmly, but allowance should be made for stem expansion. Ties should be crossed between the plant stem and stake (see diagram at top right) to prevent rubbing.

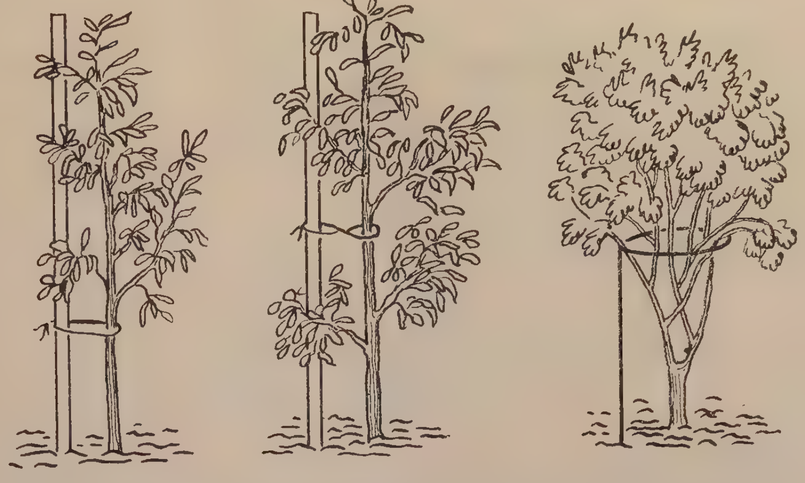
Boot and shoe cleaners: A boot scraper made from pieces of timber and metal is useful, but should be near the edge of the garden. Old crown tops nailed to a board to form a mat (see diagram below) make a good cleaner.

Storing garden stakes: Stakes should be cleaned and dried thoroughly before being stored and any broken or rotten ones should be destroyed. Both ends of stakes should be dipped in old sump oil or creosote to preserve them. Stakes should be tied in bundles and stacked in a dry, well-aired place off the ground. A rack attached inside or outside on the leeward wall of the shed is very suitable for this purpose.

Cupboards and shelves: It is advisable to have a box, shelf, or cupboard set aside for garden seeds and spray materials both for safety and convenience.

Poisonous spray materials must not be left within reach of children.

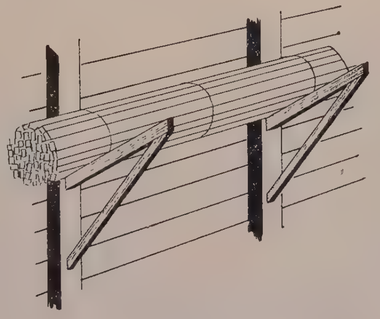
Tying up Plants



Left—Simple tie. Middle—Correctly looped tie prevents stem from rubbing on stake. Right—Wire loop for dwarf plants.

A neat shelf or cupboard can be built and technical information sheets on spraying, etc., should be kept nearby to ensure accuracy when using spray materials.

Storing Garden Stakes



Rack on wall of shed for bundle of stakes.

Labelling gardening materials: Frequently confusion arises from lack of labelling on spray materials and fertilisers. Luggage tags attached to all containers of such materials are not likely to be damaged or defaced. Clear adhesive tape placed over labels on bottles will keep labels in good condition.

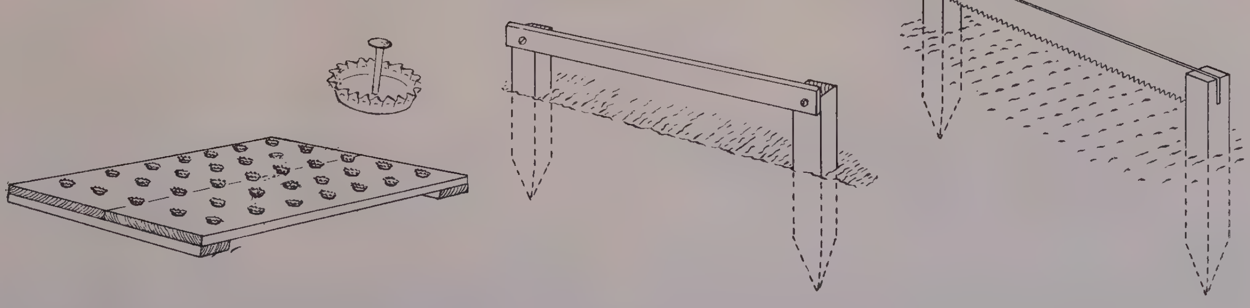
Spray materials should always be clearly labelled, not placed in unmarked containers.

Dispensers for insecticidal dusts and fine fertilisers: To ensure even distribution of dusts and fertilisers simple gadgets can be made which will save expense. Tins with perforated lids or wide-mesh scrim or muslin well filled with dust and shaken or tapped with a stick are satisfactory. A tin with a perforated bottom attached to a handle is useful. An old meat dish with a perforated bottom if shaken sideways with a sieving motion is a good method of distributing fertilisers evenly on home garden lawns.

Garden hose: Brackets attached to the shed wall form a good support for storing the hose. Parts and fittings for the hose should be kept in a box attached to the wall nearby (see diagram at lower left on page 206). Methods of using the hose as a sprinkler and a useful gadget to prevent the hose from damaging rows of plants are shown in the same set of diagrams.

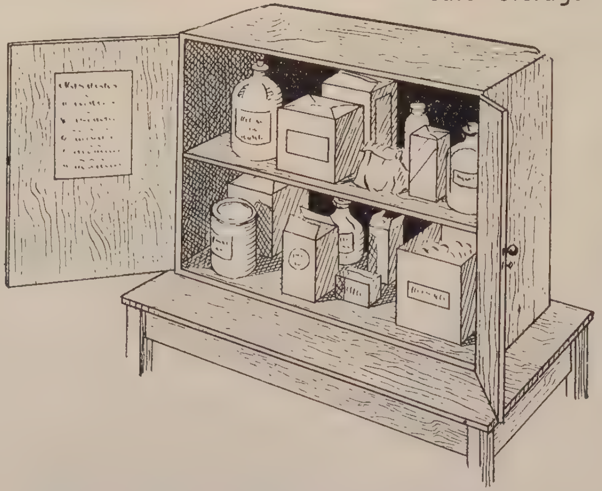
Hose attachments and watering cans: An old paint tin can be made into a useful watering can inexpensively by

Boot Mat and Boot Scrapers



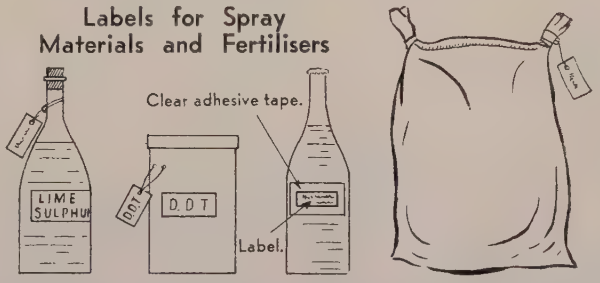
Left—Boot mat for gardening boots made from old crown tops attached with flat-head nails to wooden base 2ft. x 1ft. Middle and right—Boot scrapers made from 2in. x 2in. x 18in. stakes and old steel (middle) or saw blades (right).

Safe Storage



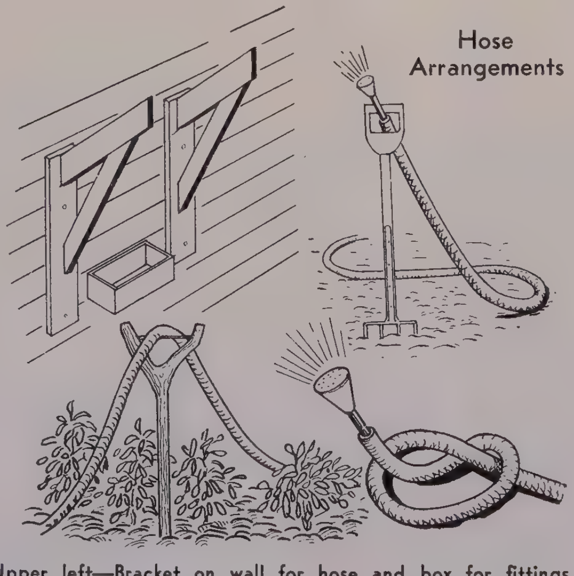
Spray materials should be kept out of reach of children in a cupboard which can be locked.

Labels for Spray Materials and Fertilisers



Luggage labels are not as easily worn off bottles and bags by handling as existing labels. Old brands on sacks are frequently confusing. Labels on bottles can be preserved by covering them with clear adhesive tape, as shown on the bottle at right.

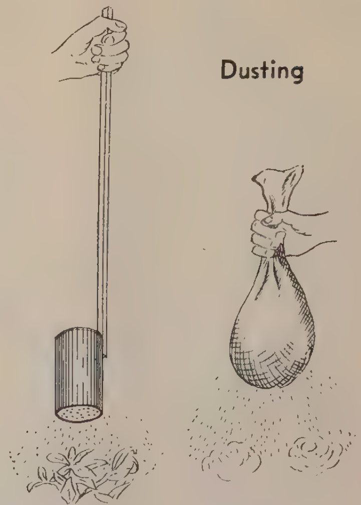
Hose Arrangements



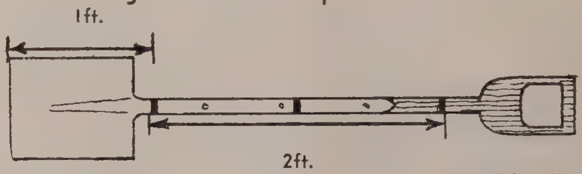
Upper left—Bracket on wall for hose and box for fittings. Upper right and lower right—Methods of using hose as sprinkler. Lower left—Stand made from forked branch and No. 8 wire to hold hose above rows of plants to prevent damage caused by hose being dragged through rows.

Dusting

At right—Methods of applying insecticidal dusts and fine fertilisers.

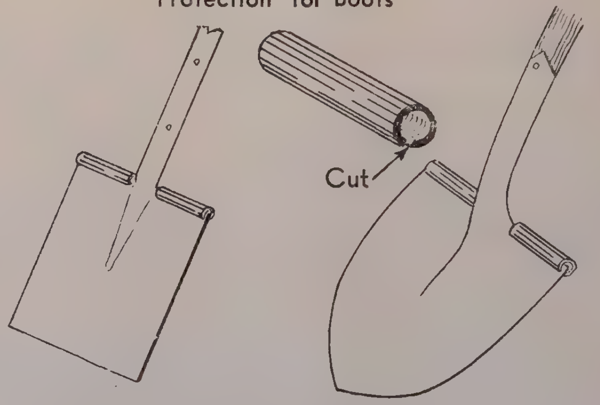


Marking Handles of Spades or Shovels



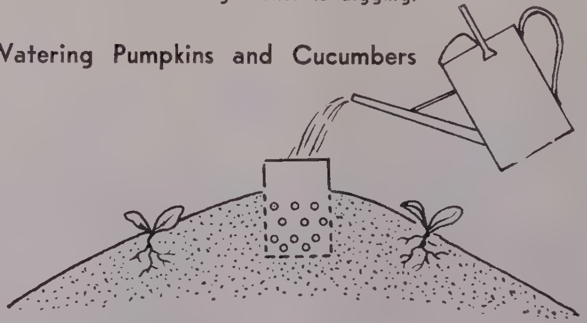
Painted bands or shallow saw cuts on spade or shovel handles at suitable intervals are useful for marking out rows and distances between plants.

Protection for Boots



Short pieces of hose cut on one side so that they can be attached as shown to spades or shovels save wear on boots when the gardener is digging.

Watering Pumpkins and Cucumbers



This method of sinking a tin with holes in the sides in pumpkin, cucumber, or marrow mounds and pouring water into the tin makes watering convenient and prevents soil from being washed away.

the use of a short length of ½in. pipe and two nuts. A thread on both ends of the pipe is necessary for attachments (see illustration below). A rose nozzle is best for both hoses and watering cans, as the water tends to splash too heavily from jet nozzles.

A tin flap attachment on the watering can is useful when liquid manure or large quantities of water are being used. The flap fans out the water and helps to disperse it.

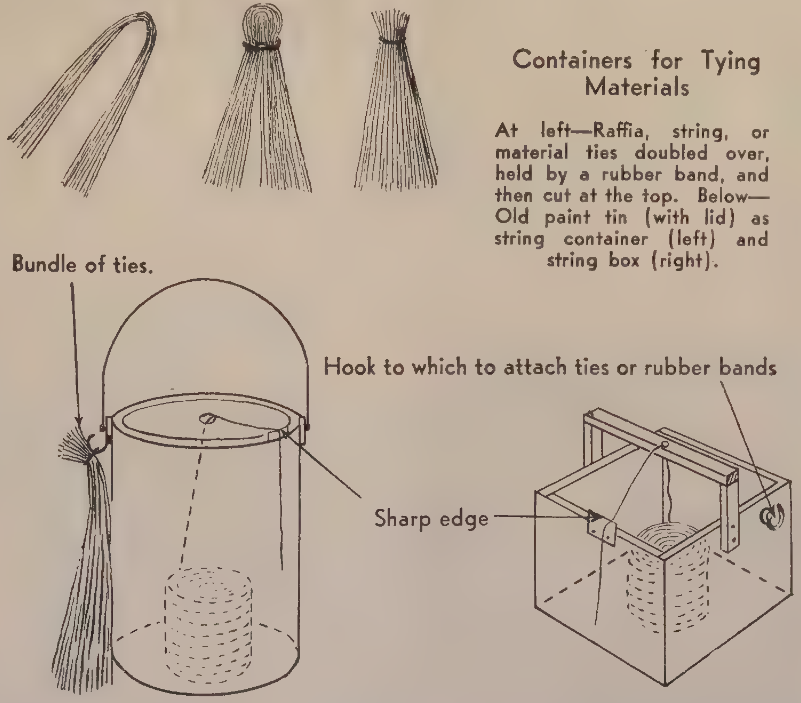
Watering pumpkins, marrows, and cucumbers: Large tins perforated on the sides and embedded in the pumpkin mounds before seed is sown will facilitate watering of established plants, as the water can be poured quickly into the tin and left to soak into the mound, thus penetrating to the roots without washing away the soil.

Old Knives and Scissors

Small tools and attachments: An old carving knife and old scissors are useful garden tools. Scissors are handy for trimming the roots of leeks, onions, and other seedlings when transplanting, and a carving knife is useful for many operations, including the harvesting of vegetables.

Shallow saw cuts or paint marks at required distances on spade or shovel handles are a useful guide for the marking out of rows. Short pieces of hose attached to the part of the shovel or spade with which the foot comes in contact will protect boots when digging is being done. (See lower illustration at right on page 206.)

String containers: String, raffia, and other material for tying plants and rubber bands can be neatly kept in a box or tin. Balls of string or twine can be made more readily available if they are kept in a container. Ties can be attached to the container by hooks. A well-made container can be very useful and is convenient to carry about. Diagrams of containers made from old paint tins or small boxes are shown at right above. A sharp edge attached to the container is useful for cutting the string or twine.



Containers for Tying Materials

At left—Raffia, string, or material ties doubled over, held by a rubber band, and then cut at the top. Below—Old paint tin (with lid) as string container (left) and string box (right).

Home-made Potting Boxes

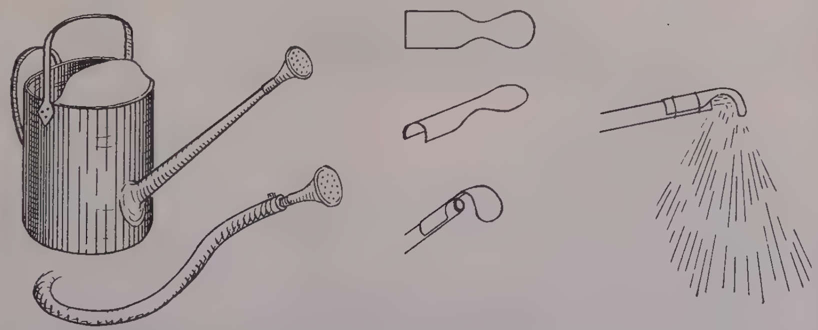
Potting boxes, seed boxes, plant beds: A useful and easily made potting box can be made from small pieces of asbestos board, which can be easily cut with an old saw and holes drilled to take copper wires which will hold the sides together. (See middle illustration on page 209.)

In most districts it is advisable to have seed-beds in the home garden slightly raised above normal soil level, as the soil remains warm and drainage is better than in beds on the flat. Six inch boards firmly secured at the corners form good supports for the raised soil and stout pegs at the corners are necessary. The bed can be filled with good soil or sieved compost.

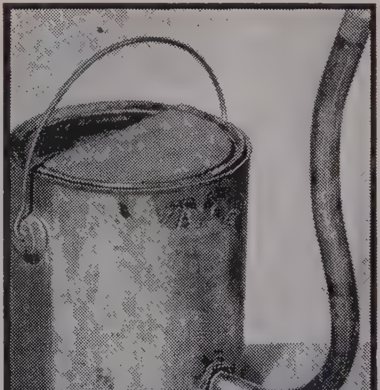
Seed boxes are very useful for growing early lettuce and tomato plants, as they can be shifted to sheltered positions during frosty nights or stormy weather. Handles made or fitted as shown in the bottom diagram on page 209 will make boxes easier to handle.

Seed crates for potatoes: Seed crates should be light and airy with a wire netting or wooden slat bottom; if wire netting is attached, a crate can be used as a small sieve, as a seed-bed protector when inverted, or for carrying vegetables from the garden to the house. Holes cut for hand grips or small wooden block handles are useful. (See top diagrams on page 209.)

Watering Attachments



A rose head on the watering can (upper left) is best for gentle watering of seedlings, etc. A fine rose for a hose (lower left) is best. A flap made from a piece of tin (as shown at right) will fan out water from a large can and is useful for distributing liquid manure.



Watering can made from old paint tin, length of ½in. pipe, and 2 nuts.

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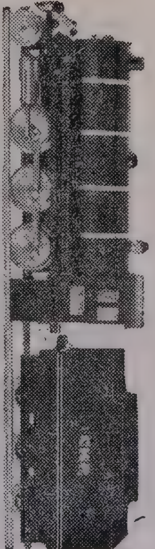

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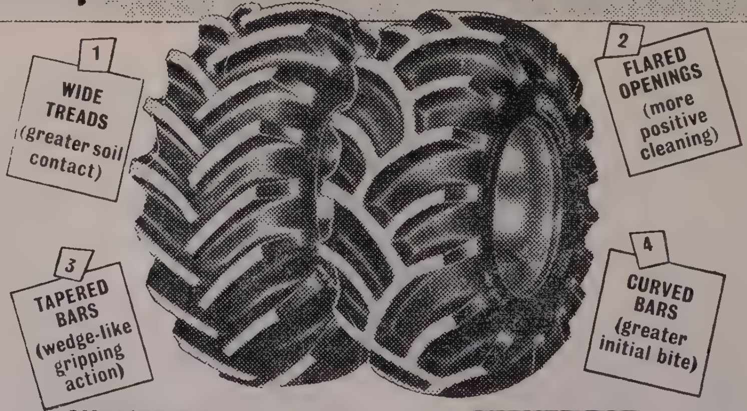
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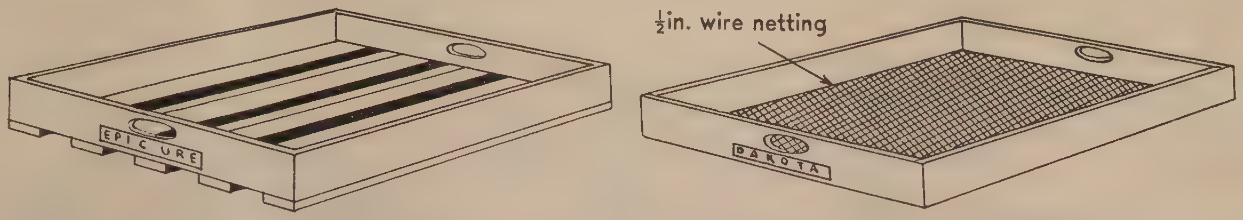
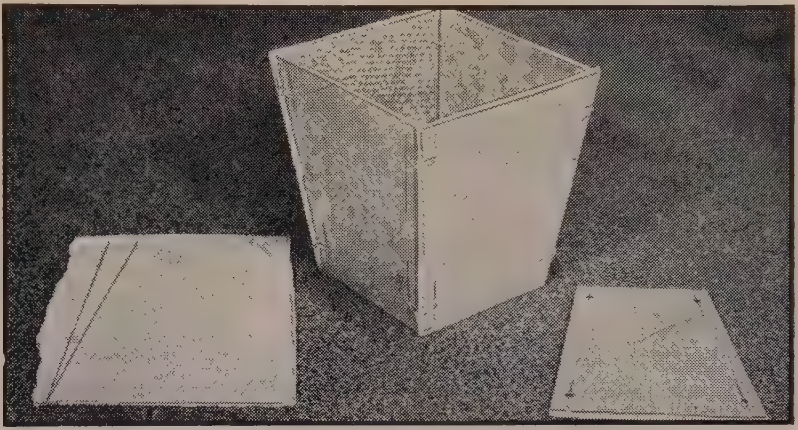
Two Types of Crate for Seed Potatoes

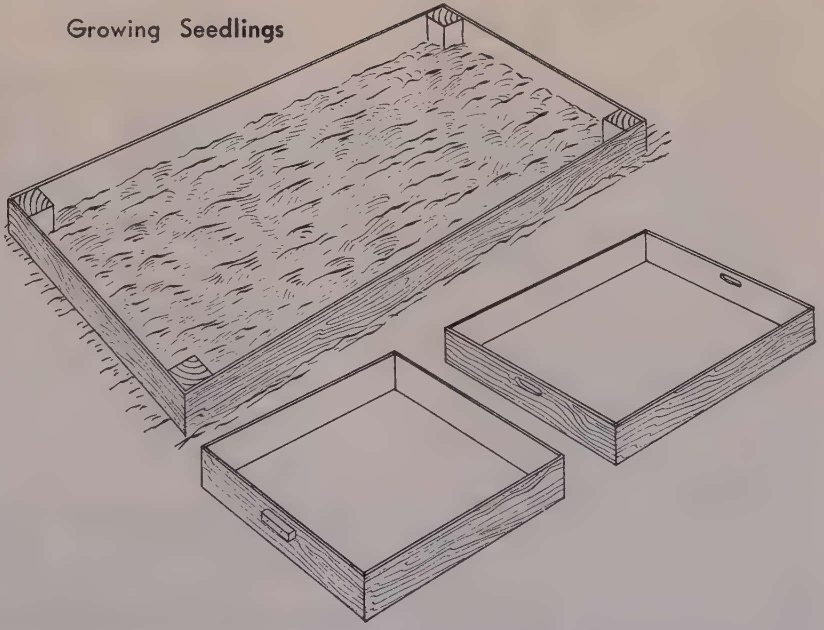


These crates are 2ft. 6in. x 1ft. 4in. x 3in. That at left has 2in.-wide slats $1\frac{1}{2}$in. apart; that at right has a bottom of $\frac{1}{2}$in. wire netting and could be used also as a sieve, as a seed-bed cover (inverted), or for carrying vegetables. Labels show the variety of seed.



Potting box made from small pieces of asbestos board.

Growing Seedlings



Raised seedling bed in garden—it should be near a path—and seedling boxes with different types of handles.

Tins and Drums

Use of old tins and drums: Small fruit tins with lids and bottoms removed may be used for placing around young plants for protection from wind and slugs and snails.

Herbs, particularly mint, can be grown in old drums, which can be sunk into the soil out of sight or placed in some corner. The spreading rhizomes of mint are then restricted, but soil and manure should be replenished from time to time and water should be applied regularly to prevent drying out.

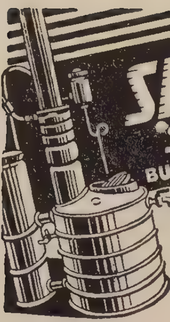
A useful garden incinerator can be made from an old drum by cutting out a small, square ash door and placing iron pipes through holes just above it. Diagrams illustrating uses for tins and drums are given at the top of page 211.

Liquid manure: Animal manure can be made into liquid manure in an old barrel or drum. The manure should be placed in wide-mesh scrim or sacking and suspended in water. Lime and artificial fertilisers can be added to the liquid manure before it is applied. A tin dipper for removing the manure is shown in the middle illustration on page 211.

Compost bins: Angle iron makes excellent grooves for the sliding pieces of compost bins, which should be well made and built of lasting materials. For ease in removing the sliding pieces small blocks or handles can be attached. The boards frequently become jammed in the grooves through swelling or pressure and the handles shown in the diagram at the bottom of page 211 facilitate their removal. Compost bins should be covered during wet weather and a useful type of roof can easily be made. A sloping cover made from old pieces of corrugated iron (see diagram on page 211) can also be used as a tray for carrying the compost on.

Lawn mower as wheelbarrow: A lawn mower can be used as a wheelbarrow by fitting a few small attachments to any size of box. Wooden slats on the bottom of the box fit over the roller and two slats at one end of the box fit over the handle. A small hook will hold the box firmly. (See the illustration at the top of page 212.)

Levelling the lawn or garden: Two bottles and a hose form an efficient levelling device. The hose, filled with water, has each end inserted in a bottle. When either of the bottles is



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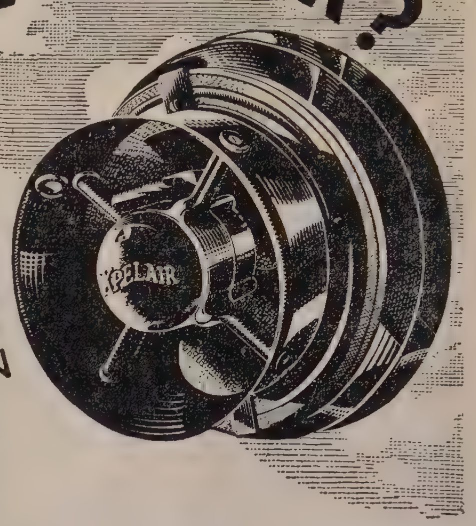

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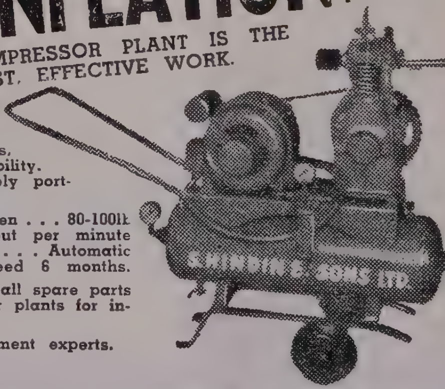
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raised or lowered the water moves into the lower one, and when both bottles are at the same level the water level in each will be the same.

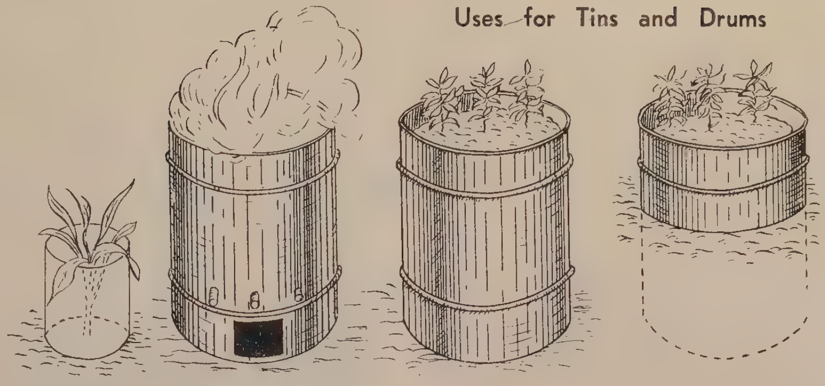
A straight-edged board and spirit level are also useful for levelling areas.

A simple soil leveller which is very useful for levelling a lawn can be made from pieces of timber. The blade should be about 4ft. long. (See diagram at bottom of page 212.)

Work for April

SOIL and air conditions usually become much cooler during April and consequently success from seed sowing is not as certain as with sowings made earlier in autumn. However, hardy seedlings of brassicas and silver beet can safely be planted out. Late crops for storage should be harvested continuously and all vacant plots sown to green crops.

Uses for Tins and Drums



Tins with tops and bottoms removed make good shelter for young plants (left). Drums can be converted into suitable incinerators by cutting out an opening from which to remove ashes and by fitting iron bars or pipes across the drum (middle). Mint can be grown in drums (right), which may be sunk in the soil as shown.

Sowings

Broad beans may be sown this month, provided early-spring conditions are normally satisfactory for setting of pods. If soil conditions are liable to be very wet during the next few months, the beans can be sown on ridges to reduce root damage. Good varieties are Broad Windsor (early) and Longpod.

The ridge method of sowing can be used for many vegetables at this time of the year, including carrots, which can also be sown now. The lighter soils are best for carrots, which can be thinly sown broadcast on flattened, raised beds. Early types such as Early Krop and Early Horn are suitable, although in very favoured localities Manchester Table and Chantenay should produce good roots.

If sowings of spring cabbage (Flower of Spring and Enfield Market) were not made last month, they should be made now. Thin sowing will reduce the possibility of mildew developing among foliage of close-growing seedlings that is too dense.

Lettuce of Imperial 615 variety is suitable for present sowing, but should be sown on soil that will not become too cold or wet.

Spinach should do well if sown now in Hawkes Bay, Manawatu, and Christchurch, the prickly type being most suitable. This vegetable may need boosting during winter, and growth can be encouraged by side dressings of nitrate of soda.

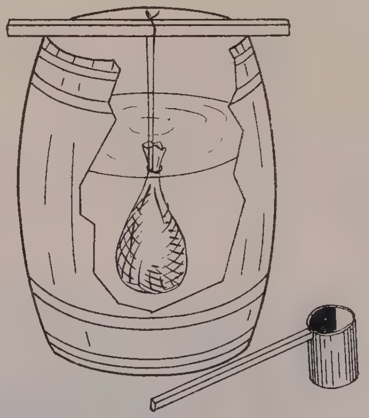
April is a suitable month for sowing onions in most districts for later transplanting. Ailsa Craig and Straw Spanish are recommended early varieties and Pukekohe Long Keeper is the chief main-crop variety.

Silver beet is a good standby in the home garden, and in many localities it can be sown throughout the year to provide a continuous supply of young leaves.

Plantings

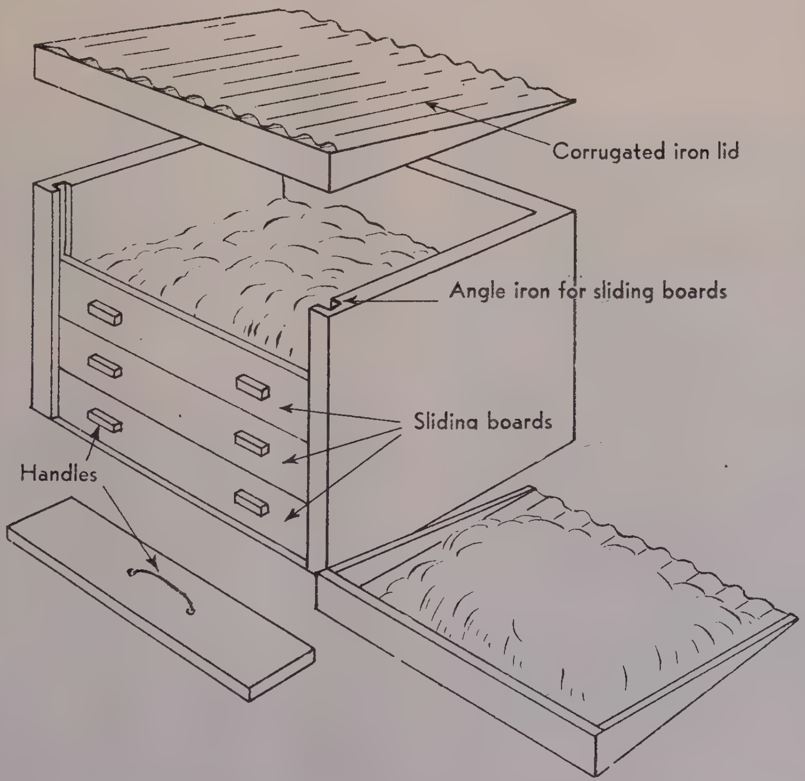
In localities where early sowings were made spring cabbage seedlings may now be ready for setting out. Growth will be better if the plants are set on ridges, as the soil will tend to be warmer and excess moisture to be

Liquid Manure



Sack containing animal manure and fertilisers suspended in water in old barrel or drum. The dipper (bottom right) is made from a paint tin with a wooden handle screwed on.

Compost Bin Hints



The lid of this compost bin when inverted serves as a tray for distributing compost.

reduced. Suitable varieties of cauliflowers for setting out now include Early London, Walcheren, and Phenomenal Early in the North Island and Early London, Roscoff strains, and Phenomenal (5 months) in the South Island. If April is dry, cauliflowers should be kept moist, as they do not stand checks in growth.

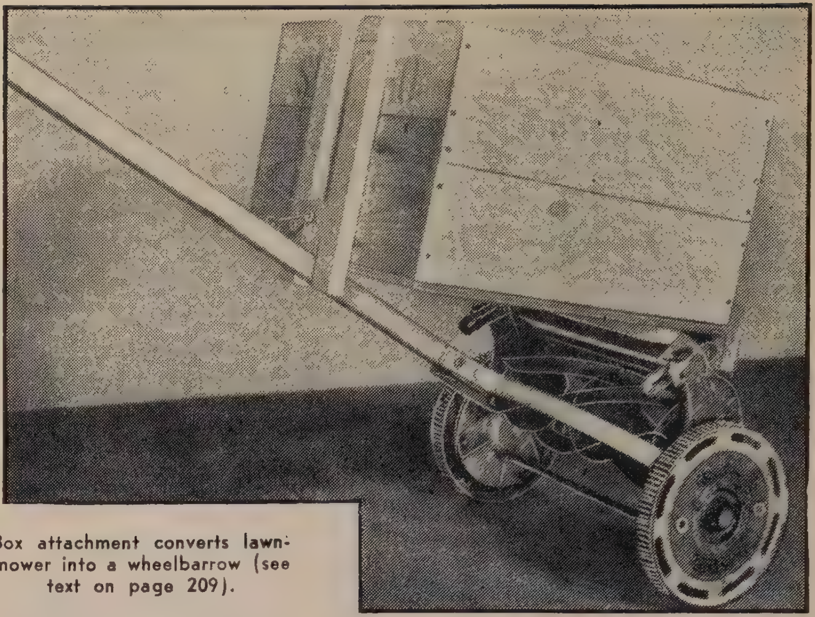
Harvesting Crops for Storage

Pumpkins should not be harvested for storage until the vines have died down. The fruits should then be firm and properly matured. Onions store best when the necks are very thin, the bulbs are completely dry, and the skins crisp. Drying is best done outdoors if possible, but excess moisture should be kept off the bulbs after they are pulled for drying.

Potatoes for winter use should not be dug until the tops have died down or at least turned brown. Skins of tubers should be firm and dry before potatoes are bagged or boxed to avoid bruising in storage. If the tubers can be left in the ground for a week or two after the tops die down, they will harden up. Kumaras store best when they have been cured in the sun for a few days after digging.

Root crops such as carrots, parsnips, and beetroot can be left in the ground in milder districts, but in others roots keep better if lifted and stored in pits in the ground or in clamps in a similar manner to potatoes.

All vegetables for storage should be handled carefully and be without blemish; otherwise loss can be considerable later.



Box attachment converts lawn-mower into a wheelbarrow (see text on page 209).

Harvesting Current Crops

Crops such as tomatoes, beans, and peas should be harvested regularly. Pod crops, in particular, will produce over a longer period if the fruits are removed continuously. If the produce from these crops is too great for home consumption, a portion of a row may be left to mature for seed. Only favoured localities will be able to carry on tender crops at this stage, as frosts will be damaging in many districts. If this is so, tomatoes can be pulled up by the roots and hung in a sheltered position for the fruits to colour. Alternatively they can be picked and coloured inside. If cloches are available, these could be put over the lower-growing crops to shelter them from early frosts.

Green Cropping

Provided they are not required for sowing or planting in the near future, all vacant plots should be sown to a green crop. Crops such as lupins, barley, and mustard improve the condition of the soil and check winter weed growth. Cereals such as barley and oats usually do best during the cooler periods and provide a good bulk of organic matter.

Disease and Pest Control

Diseases and pests will probably still be troublesome in some districts and will need to be controlled. Applications of sprays to crops being harvested should be done cautiously, as most sprays are toxic to humans. Fungous diseases may be more troublesome than insect pests as conditions become cooler and moister, and Bordeaux spray (4oz. of bluestone and 5oz. of hydrated lime to 4 gallons of water) will be found suitable. This spray should control mildews of most leaf crops such as brassicas and lettuces not required for immediate use.

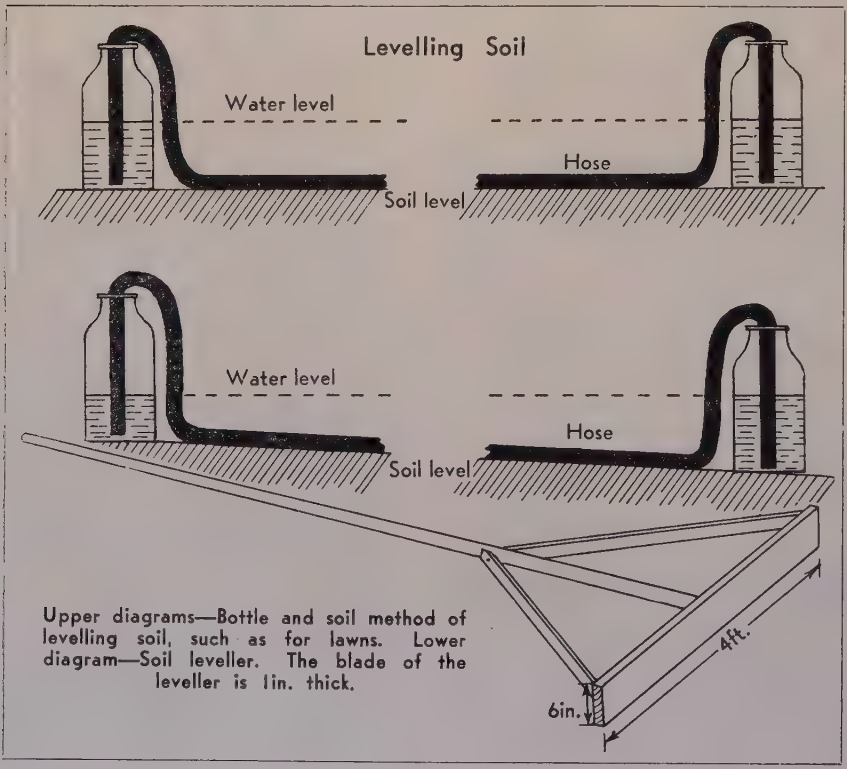
Other Work

All diseased plant refuse should be burnt and the ashes and healthy plant refuse put on the compost heap.

Celery and leeks should be moulded up or the trenches filled with soil to assist blanching of the stems.

As asparagus fern growth turns brown but before the seeds drop it should be cut off a few inches above soil level and burnt. Beds can then be cleared of weeds, forked over lightly, and dressed with stable manure, compost, or a mixture of sawdust and poultry manure.

Summer rhubarb can be lifted now if it has been in one position for over 3 years. Clumps will stand well under a hedge while a new bed is being prepared. They can then be split between the crown buds when these develop and be replanted immediately.



Upper diagrams—Bottle and soil method of levelling soil, such as for lawns. Lower diagram—Soil leveller. The blade of the leveller is 1in. thick.

Battery Laying Cage System of Egg Production

THE subject of the battery laying cage, which has lately come to the fore in New Zealand, is discussed in this article by J. H. Jones, Poultry Instructor, Department of Agriculture, Christchurch, who has had experience with this system of management. Its advantages and disadvantages to the commercial egg producer are dealt with.

ALTHOUGH of comparatively recent origin, the system of keeping birds in laying cages has made huge advances in post-war years, especially in Britain and America, and about 4 million cages are in use in Britain alone. With the return to seasonal egg prices in that country and the doubling in the price of feeding stuffs since the war, economic management became of paramount importance, and the fact that laying cages are now more popular than ever speaks favourably for their efficiency. Closely rivalling them is the deep-litter system, and it remains to be proved which is the most economic, as the deep-litter system has the advantages of lower capital outlay and a greater bird capacity per man in charge.

The object of the hen battery system for commercial egg production is to provide each bird with a separate environment in which conditions for laying are as near as possible to ideal. Each bird is able to take its full share of food and water, it can be given individual attention, and bullying is not possible. Recording of eggs to each individual bird becomes comparatively simple and culling can therefore be very efficient, and for this purpose the droppings can also act as a guide. Under these conditions the environment of the birds becomes more stable, they are less affected by climatic conditions, and the capabilities of different breeds, families, and strains may be compared effectively.

Pullets may be brought into the cages before they begin laying and can cause no trouble by not perching, or by perching in the wrong place. Crowding in corners no longer is a problem and neither are colds, which may upset laying considerably. The birds are safe from vermin. There are no difficulties caused by bringing together birds of different age groups and there is less likelihood of the early-hatched birds moulting soon after they start laying.

The greatest advantages of laying cages are:—

The increase in egg production brought about over the whole flock throughout the year because of the excellent conditions and the fact that this increase represents an evening out of the seasonal production, so that more eggs are produced during the winter period of high prices.

Eggs are not soiled by stains, droppings, mud, etc., and are in perfect condition for marketing.

Higher winter production is also helped by the use of artificial lighting during winter.

Birds are not usually kept for more than one laying season in laying cages, because second-year birds, under any system, tend to reduce their winter production and become less economic. However, at the end of their laying season they are in excellent condition for the table, being well fleshed and soft. The lower producers can be sold first, leaving the persistent layers to the last.

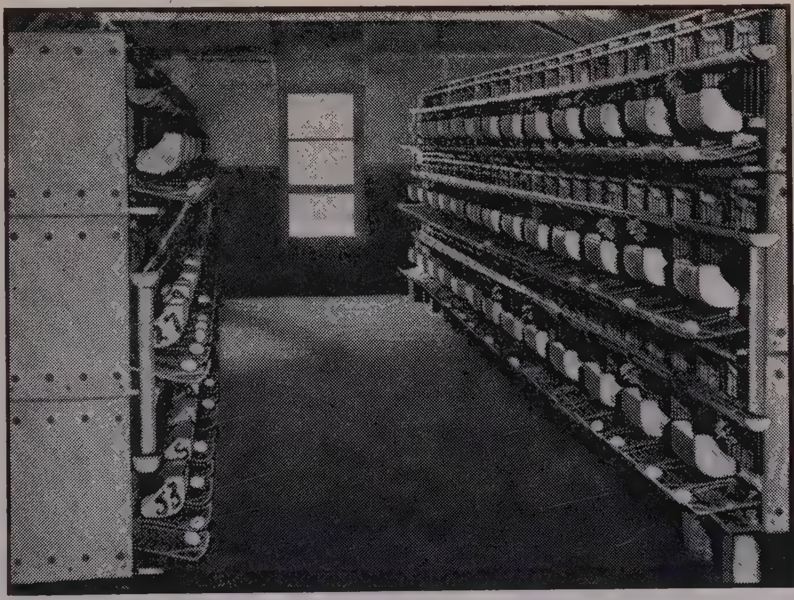
Broodiness is not excessive in the wire-floored cages, which are similar in effect to broody coops, and in well-designed cages feather plucking should not occur between neighbours. Individual batches of birds can be fed different rations if their condition necessitates this treatment. Before they are sold for the table, persistent producers might require to be fed a grain ration.

No outlay is necessary for litter or nesting material and the system allows for a large number of birds for the floor space. Modern designs of cages can provide automatic feeding, watering, and cleaning, and the number of man-hours can in this way be cut down.

The chief disadvantage of the battery system is the high cost of the cages together with the necessary building to house them. It is also claimed that with a suitable layout more birds per man can be kept on the deep-litter system. About 2000 could be handled by a man in an 8-hour day under the cafeteria cage system, and rather more than 1000 with the non-automatic cages, whereas some authorities claim that a man can look after over 3000 on the deep-litter system, especially in some of the large, highly mechanised houses in the United States and in England, where they are beginning to be introduced. Egg production should not differ much between the two systems, but the increased capacity for culling in the cages should enable a higher average to be maintained. Dangers from spread of disease and feather picking are definitely greater in the deep-litter system, because the birds have more direct access to one another and the caged birds are less likely to pick up parasites.

The suggestion that eggs from battery birds are inferior to those from birds with access to grass has no foundation, as it has been proved that their composition is very similar and that they are in no way lacking in essential vitamins. Birds kept intensively under any system, however, depend for their health entirely on the diet provided by the attendant, as they are not able to supplement any deficiencies, especially in batteries which have not even litter to scratch in.

So far the battery system for large units has been discussed, but an important aspect is its usefulness on a very small scale in backyards. Here an indoor or outdoor unit may consist of as few as half-a-dozen cages and the owner may fill up the mash and water troughs and grit box and leave the birds safely for 2 or 3 days, whereas under any other system he could not do this. He may increase his flock simply by adding a few more cages and if he wishes to carry on his birds for a second year, he may do so and have the pullets in cages alongside them. This advantage of being able to leave the birds over the weekend would of course also apply to a large unit, but not to the electrically operated cafeteria system, which would need more frequent filling up with



"Triple-ess" cages with one food trough to each two birds. A continuous watering system is attached.

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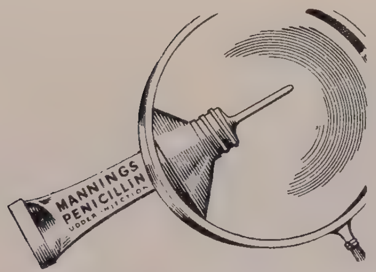

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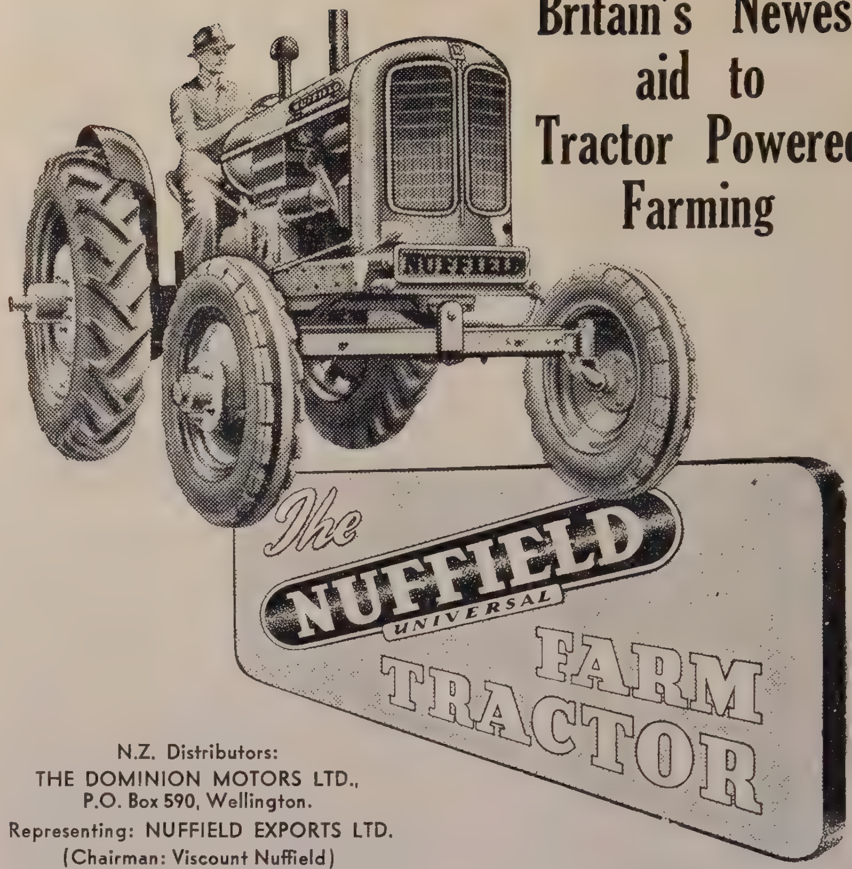

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food and might possibly break down because of electricity cuts, etc.

The hen battery system is occasionally criticised on the grounds of supposed cruelty, the critics believing that hens restricted to comparatively small cages are "unhappy" because they cannot scratch, run about, or have a dust bath. Far from being cruel, the system is quite humane if the management is good because:—

The birds are never short of food and water.

The birds can be inspected individually every day.

The birds are far less liable to infectious disease generally, and as well have comparative freedom from internal parasites.

Most important of all, birds would not put up fine egg-production records and gains in body-weight and remain healthy if they were being systematically ill-treated or kept in discomfort.

If a proper type of cage is used and the management is good and the feeding adequate (from all nutritional aspects), birds in hen battery cages will not suffer and are not inferior to other birds kept intensively.

Choice of Breed

There are possibly strains in any breed which are suitable for use in laying cages, but in general the heavy breeds and their crosses have proved the most satisfactory. Even the heavy breeds, however, may contain strains which are unsuitable. Though the light breeds eat less food, the heavy breeds are more profitable because they produce more eggs and a heavier carcass at the end of the laying season. Broodiness in the pure heavy breeds is reduced in comparison with other systems of management, but in the light-heavy crosses it is almost non-existent, which is an important factor not because broodiness reduces egg production so much as that it necessitates providing coops outside and involves the labour of removing the birds.

Some poultry farmers use laying cages to house their breeders during their pullet year and they claim that the system is easier than trapnesting and that no deterioration in condition occurs, provided of course that their diet is complete, and they may perfectly well be transferred to breeding pens during their second year.

In the laying cage system the house has to be well situated in order that quantities of food may be delivered by lorry or tractor and eggs and manure may be disposed of easily. Water and electricity supplies need to be available and with a large unit, drainage must be carefully provided for to take waste water from drinking troughs, and for the disposal of rainwater and water used in the cleaning of manure bins and wheelbarrows each day.

In calculating the size of the house 2¼ sq. ft. of floor space must be allowed per bird. Thus to accommodate 1000 layers a house 17ft. wide would require to be 132ft. in length to take 2 double rows 3 tiers high.

The design and ventilation of the house are of utmost importance. The side windows must be large and carried low enough to give light to the lowest tier of cages and it should be possible to open them wide in hot weather. Roof lights are also needed to light the cages facing the centre and besides these artificial light can profitably be used in winter. Air should be taken in through baffled inlets at floor level and should be extracted from the ridge by fixed cowls or by electric extractor fans. In this country there would be no necessity for heating the battery houses.

The requirements of an ideal battery cage are:—

That it should provide sufficient room for the bird to be comfortable and enough height for it to stand upright.

That the eggs should be able to roll freely to the front of the wire, where they can be collected.

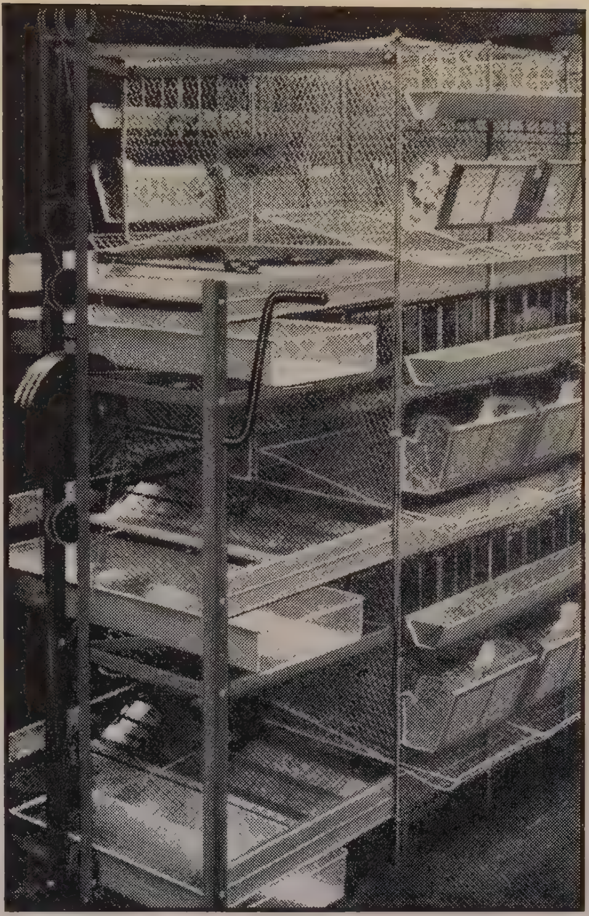
That it should allow the attendant to handle the bird easily.

That food and water troughs should be easy to fill, of sufficient capacity and hygienic, and the bottom cages should not be so low that they are difficult to tend.

That there should be an automatic device for clearing the droppings, which is a great advantage in saving labour.

In the cafeteria system the food, water, and manure scraper travel slowly up and down the cages powered by a ½ or 1 h.p. motor. This is the most labour-saving method, although there may be disadvantages in this system unless it is carefully operated. Preferably cages should have solid metal partitions between adjacent birds to prevent vices such as feather plucking, but small-mesh wire can be used as an alternative. The most useful design of cage front is one which allows some 5in. in which the bird may be put into the cage, but through which it cannot escape again. Over this space fits the food trough. Water troughs are always toward the top of the cage, but care should be taken to see that they are easily accessible.

The most suitable form in which to present the food is in pellets, which are less wasteful than mash. They also tend to improve production and egg size and to increase body-weight. Grain may also be fed, supplemented of course by meat meal, and grit should always be available. Heavy breeds will consume about 6oz. of food per day.



"Hudson-Laymor" with triple-tier cleaning mechanism.

Keeping birds in laying batteries is an elastic system, capable of expansion by the addition of further blocks of cages. If the stock housed is reasonably good, replacements of birds during the year should not exceed about 20 per cent.

If it were possible to produce cages at a reasonable price in New Zealand, this system of keeping birds for commercial egg production would have a great deal to recommend it, especially where space is a problem, but as with all systems of keeping poultry, capital outlay must be the deciding factor.

Acknowledgment

The two illustrations in this article are from "Hen Batteries", by Dr. W. P. Blount, published by Bailliere, Tindall & Cox Ltd., London, 1951.

Poultry Feeding

A new issue of Bulletin No. 198, "The Theory and Practice of Feeding", which is Part 4 in the series on poultry keeping published by the Department of Agriculture, is now available. The new publication is larger than the original Bulletin No. 198, has more illustrations, and covers the subject more fully.

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Dogs carry *Hydatid tapeworms*, but do not grow the cysts like human beings, and stock animals. In their droppings, they scatter the *Hydatid tapeworm* eggs from which grow these dangerous cysts. As dust, the eggs are blown on to stock pastures, or adhere to the coats of dogs, and so reach human hands. The disease can be stopped by these precautions:

1. After handling animals, never put hand to mouth without washing. Make sure children wash hands before eating.

2. Wash carefully, all vegetables and fruit eaten raw. They, too, can harbour the tiny tapeworm eggs.

3. Never throw raw liver or lungs of sheep to dogs. Cut offal into slices and boil first. Otherwise, burn or bury it. It is here that dogs become infected.

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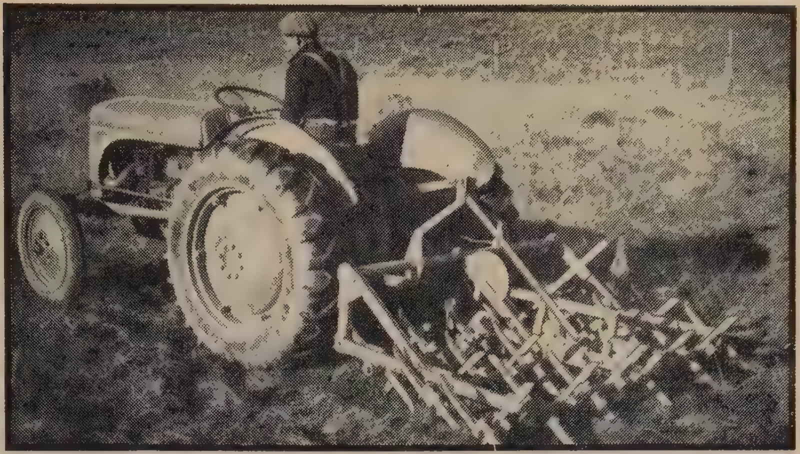
11.2a

The Pitch-pole Cultivator

A CULTIVATING implement known as a pitch-pole cultivator, which can be readily operated to clear its tines of accumulating roots, turf, or other surface trash, has appeared on the market recently. Several models are or shortly will be available and should fill a need, more especially where ground containing twitch, crop stems, or turf is commonly cultivated. The narrow set of tines also mounted on this cultivator—each machine has two different sets of tines—is useful for penetrating hard ground, smashing clods, surface working old, sodbound turf before ploughing, or for opening up a sward to permit oversowing or better aeration and surface drainage. This implement appears capable of both grubbing and harrowing, and in this article L. H. Weston, Fields Instructor, Department of Agriculture, Timaru, emphasises its ability to work efficiently in "trashy" or twitchy ground.


A mounted type pitch-pole cultivator cultivating old browntop turf.

THE pitch-pole cultivator consists essentially of three "poles" or axles at right angles to the direction of travel mounted in bearings on a framework which enables the poles to rotate when a lever is tripped. When the cultivator is in the working position an arm on each pole rests against a stop to prevent rotation of the tines. Two separate series of double-ended tines are fitted on each axle. One series consists of wide tines tapering 1½in. to ¾in. from top to bottom and with a forward-curving tip. The leading edges of the straight, narrow-tine series taper to 1/16in. They are knife-like in appearance and, if necessary, could be sharpened to give a better chopping action. Two bolts secure each tine to the pole. The bolts are readily accessible, so that adjustment or replacement of tines is simple.

Arrangement of Tines

The arrangement of tines allows a choice of two different working points, and according to requirements either of the two series can be brought into working position by manual adjustment. The set of the tines is adjustable over a wide range, the angle of penetration being predetermined by the positioning of the stop arm on the spline of each pole.

The series of tines can be quickly rotated immediately there is any tendency to clog. Because of this clearing ability in trash-littered ground, effective tine spacings on these cultivators can be reduced to 3½ to 4½in. compared with the 5½ to 7in. spacings normally used on orthodox spring- and stiff-tine grubbers.

Types Available

At least six models of pitch-pole cultivators are at present manufactured, with prices ranging between £60 and £100. Both light- and heavy-duty types are available with working widths of 6ft. 6in., 7ft. 3in., and 8ft. 3in. Tines are obtainable in either 11in. or 13in. lengths.

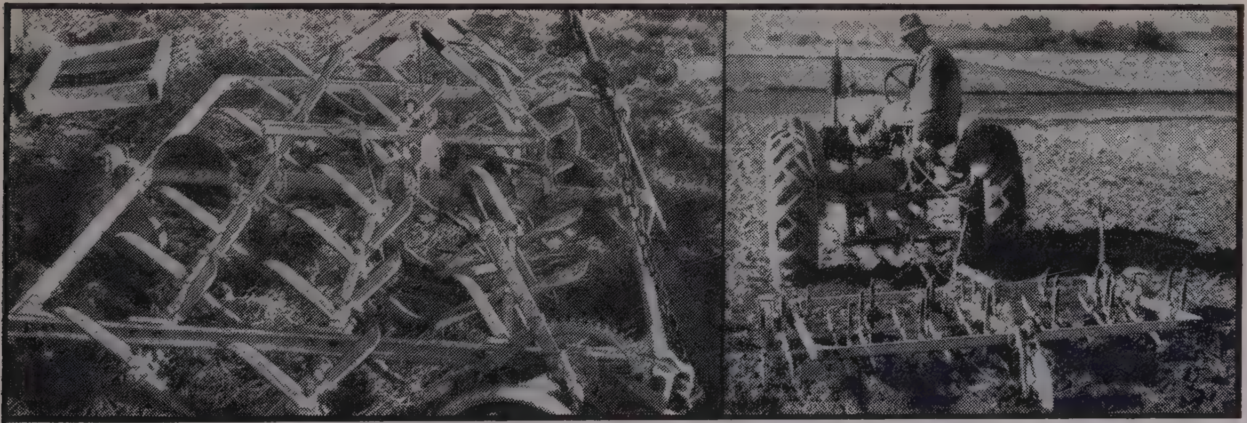
The U-shaped steel frame of this solidly constructed implement may have attachments for three-point hydraulic linkage, with depth adjustment according to hydraulic-linkage settings, as in tractor-mounted models. Alternatively the frame may be fitted with two side wheels, with lever depth adjustment, and an adjustable rear-mounted disc, as in trailer types.

Working Technique

When working effectively, the smaller models of pitch-pole cultivators require at least 20 drawbar h.p. The heavy-duty types need 25 to 30 drawbar h.p. when operating in sodbound pasture and hard ground or when working deep. By progressively adjusting depth the operator can work in easy stages under tough conditions.

The tripping mechanism, which allows the poles and tines to rotate, is operated by a cord from the tractor driver's seat and may be used to dispose periodically of trash collected while the implement is working, and to allow the tines to revolve without working over the headlands. A catch on the releasing lever comes into action when the cord is tugged and then returns slowly. Another pull sets the implement working again.

A number of these implements are now operating throughout New Zealand. If they prove as adaptable and useful as initial experience suggests, farmers may find that the pitch pole will replace more than one of their present range of implements. It will doubtless find its greatest sphere of usefulness as an efficient and time- and labour-saving implement on twitchy land under arable farming conditions.


Left—A tractor type pitch-pole cultivator with the drawbar raised. Right—The cultivator at work on twitch-infested ground.

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Fodder Beet for Feeding Pigs

SUGAR beet has been used as a root crop for pigs for a number of years in New Zealand. During the last 2 or 3 years a new root known as Danish fodder beet has been grown by a number of farmers, and in this article I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington, gives details about this crop.

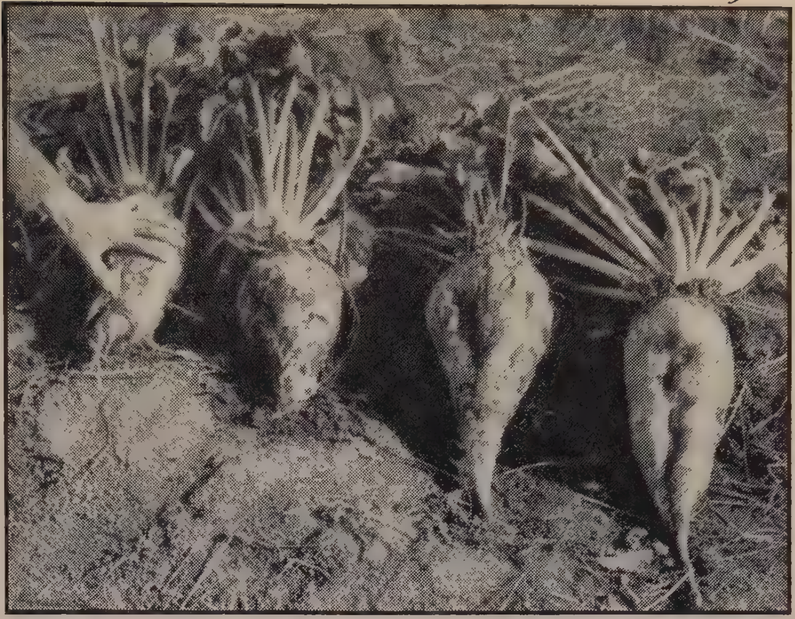
ALTHOUGH fodder beet is a comparatively new crop in New Zealand, it has been used extensively in Denmark for the last 22 years and today can be said to have virtually replaced mangolds for stock feeding in that country. There are two types of fodder beet in use in Denmark. The first, known as fodder sugar beet, is the produce of crosses between the sugar beet and the mangold, the mangold used being known as the Barres type on the Continent of Europe and Orange Intermediate in Britain and New Zealand. The second type is known in Denmark as sugar beet for fodder and is the product of selections from sugar beet, no cross being involved.

On the Continent the term fodder beet is used to cover all types of the *Beta* species used for stock feeding, from mangolds to sugar beet. In Britain the term is applied to both fodder sugar beet and sugar beet for fodder, a number of varieties of both having been used there during the last 6 years. In New Zealand seed of only one variety has been imported, Pajbjerg Rex X. This is a fodder sugar beet, which is a product of crosses between the sugar beet and the mangold. The seed was imported from Denmark and it is known in New Zealand as Danish fodder beet.

The aim with fodder beet, as it will be referred to in this article, was to produce a root combining the high feed value of sugar beet with the high tonnage per acre of mangolds and like mangolds growing well out of the ground, which makes for easy lifting of the crop. Considerable success in this direction was achieved.

The high feed value of sugar beet is due to its dry-matter content, from 20 to 25 per cent., of which some two-thirds is sugar. Mangolds, on the other hand, contain only some 10 to 15 per cent. of dry matter. The tops of sugar beet are also of good feed value and this factor was also looked for in the cross. The result was a root yielding a considerably higher tonnage per acre than sugar beet, with a dry-matter content of 17 to 20 per cent. and a better developed top than either the sugar beet or the mangold, having a high food value.

A large number of varieties of fodder beet have been developed in Denmark and also in Sweden and the Netherlands. The dry-matter content of these varieties varies considerably and those with the higher dry-matter content are more suitable for feeding to pigs. The varieties of lower dry-matter content are used for cattle feeding, for which they are preferable.



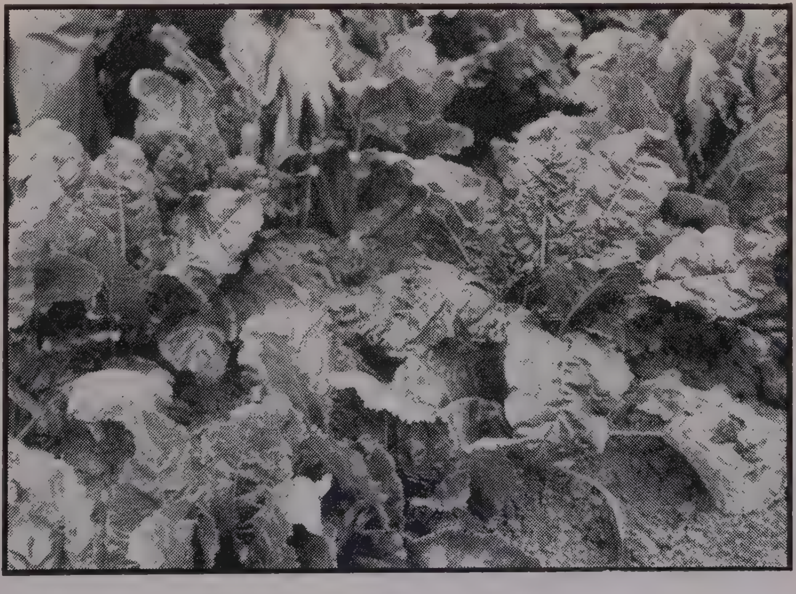
Fodder beet roots grown in Gisborne district.

The reason for the better results with pigs when fodder beet with a high dry-matter content is used is that the pig has one simple stomach only, and not a very large one, so that the less bulk there is in its food in proportion to nutritive value the better. Pajbjerg Rex X variety is very satisfactory in this respect, averaging just over 19 per cent. of dry matter.

Preparing Seed-bed

Although fodder beet grows as much as half out of the ground, it is still deep rooted and so deep ploughing is recommended. On deep and fertile soils excellent crops can be grown by ploughing out of grass in September and sowing about the middle of October. On these soils the turf breaks down easily and conditions are ideal.

Under the more difficult conditions likely to be found on many farms it is necessary to skim plough in autumn or early winter, or to disc the turf heavily at this time, following this by deep ploughing in July or August. A good deep tilth and a fine seed-bed are required, and to obtain these and



Fodder beet showing the prolific growth of tops, which have a high food value.

a good crop thorough cultivation is necessary. The furrows should be rolled and then repeatedly cross-disced, harrowed, and rolled until the required seed-bed is achieved.

Manurial Treatment

Fodder beet, like sugar beet and mangolds, is a gross feeder and responds well to fertile conditions. Unless the paddock has been limed regularly, some 5 to 10cwt. of lime per acre should be applied, as fodder beet requires a sweet soil. A liberal dressing of well-rotted cowyard manure, if it is available, ploughed in will give excellent results as far as supplying the additional nitrogen that this crop requires for its strong growth of leaves. Artificial manures for a first crop after grass on fertile soils can be confined to 5 to 6cwt. of superphosphate per acre. Where no cowyard manure is available superphosphate and blood and bone could be used.

On less fertile soils the value of cowyard manure is very great if it is ploughed in early. Where it is not available a mixture containing readily available nitrogen in addition to the nitrogen in the blood and bone manure is recommended. A suitable mixture would be 3cwt. of superphosphate, 3cwt. of blood and bone, and 1cwt. of sulphate of ammonia. In soils where potash has proved of value on the pastures the addition of 1cwt. of 30 per cent. potash per acre is advisable.

Many farmers grow crops for their pigs in pig paddocks that they wish to turn over and regrass. A paddock in which pigs have been running for some years will produce excellent crops of fodder beet without any artificial or other manure provided that a good dressing of lime is applied to sweeten the soil.

Sowing

The seed of fodder beet is similar to that of mangolds in that each "seed" is a seed case containing 2 to 4 seeds. Early sowing is advisable and in the North Island October is the best month to sow. Seeding should be at the rate of 4 to 6lb. per acre. Small areas can be sown either by dibbling in the seed by hand or with the use of a hand seeder. Field crops are usually sown with a combined ridger and sower or with an ordinary grain drill on the flat, using the mangold plates in the turnip box. The spacing between rows should be from 18 to 21in. When the ridger is used the rows are well defined and mechanical inter-hoeing for weed control can be carried out even before the plants appear in the row. On certain types of soil it is an advantage to roll the ridges immediately after sowing, particularly if the seed-bed is dry, as that assists in promoting surface moisture and aids germination.

Cultivation

To obtain really good crops care and attention should be given to cultivation. As soon as the plants are well up the rows should be hand weeded and the plants singled to a spacing of 8 to 12in. Inter-row cultivation with a scarifier should be carried out as often as is necessary for weed control. Owing to the prolific growth of the fodder-beet tops, coverage of the ground is rapid and weeds are suppressed by smothering. This means that with 18 to 21in. between the rows considerably less cultivation is necessary than with mangolds.

Transplanting

For the small areas usually required for pig feeding on New Zealand farms transplanting is very satisfactory in the North Island, where the seed can be sown early, at the end of September or beginning of October. Transplanting into well-cultivated soil is done from the beginning of December onward. Provided the soil is well cultivated, little or no cultivation after transplanting is necessary. The essential point about transplanting is the sowing of the seed as early as possible in a warm, well-sheltered nursery bed. Transplanting of the young plants, whose roots should be about the size of a man's thumb, can be done by hand or, if the area is big enough, with the plough. The plants are pressed into the fall of the newly turned furrow slice in every second furrow about 8 to 12in. apart and covered by the next furrow slice.

Feeding

Fodder beet, like sugar beet, can be fed with perfect safety to pigs of all sizes and at all stages of growth of the crop. There is no need to ripen the crop off as with mangolds. As the tops form a valuable part of the crop, they are not removed before feeding. The best way to feed fodder beet is to throw it out in a clean grass paddock, but it can equally well be fed to pigs that are housed. Cooking or boiling is unnecessary. Although it can be fed at all stages of growth, the earlier it is used the lower the total yield of the crop will be. From April onward, however, feeding will have little effect on the yield.

Fodder beet is an ideal food for feeding pigs in winter months, and can be considered the equal of sugar beet in this respect, with the advantage of a heavier crop per acre and much easier handling owing to its habit of growing well out of the ground. In late autumn toward the end of the dairying season it is used to enable pigs to be finished as porkers or light baconers that could not otherwise have been got off the farm.

Sugar beet has become a firm favourite with pig producers during the last 10 years and fodder beet with its advantages in heavier cropping and easier handling should become equally if not more popular. Although this article has been written primarily for pig producers, the use of fodder beet for other stock is well worth attention of farmers. In Denmark it has virtually replaced mangolds as a root crop for stock and is used extensively for feeding dairy cows. Its use in New Zealand for a similar purpose, particularly for town supply herds in winter, is worth consideration.

References

"Fodder-Beet, a Review", by P. J. Boyle, Commonwealth Bureau of Pastures and Fields Crops. "Fodder Beet", A. C. Dunkin. "Fodder Beet for Fattening Pigs", by K. G. Mitchell, Pig Breeders Gazette (Great Britain). "Sugar Beet for Pigs, "New Zealand Journal of Agriculture", vol. 61, p. 189.

Meteorological Records for January

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	63.7	— 1.2	80.9	46.8	2.34	14	— 2.16	0.41	24	209.0
Auckland . ..	160	65.3	— 1.1	77.1	51.6	2.98	12	— 0.20	0.49	25	191.2
Tauranga	10	63.2	— 1.4	78.8	42.6	2.69	13	— 1.25	0.49	4	230.7
Ruakura	131	61.8	— 1.3	76.8	39.7	4.78	16	+ 1.30	0.75	22	210.3
Rotorua	969	60.6	— 2.2	76.6	41.2	5.63	14	+ 1.27	1.48	12	188.2
Gisborne	12	61.5	— 3.8	78.8	45.7	4.94	19	+ 2.40	1.46	4	158.7
New Plymouth ..	160	61.5	— 0.7	73.5	47.7	4.94	10	+ 0.47	1.51	22	227.7
Napier	5	62.7	— 2.8	81.1	46.2	3.86	14	+ 1.25	0.89	13	170.6
Karioi	2125	56.2	— 0.8	76.5	33.0	5.82	17	+ 2.14	0.96	26	—
Wanganui	72	61.6	— 1.9	82.7	43.5	6.70	14	+ 3.92	1.96	27	195.2
Palmerston North .	110	60.6	— 1.8	76.2	39.2	9.64	16	+ 6.44	2.82	26	172.8
Waingawa	350	59.3	— 3.1	79.0	36.0	4.87	19	+ 2.47	1.46	25	162.4
Wellington	415	59.0	— 2.0	74.6	44.9	6.33	15	+ 3.25	1.34	26	216.0
Nelson	5	59.9	— 1.7	76.2	41.4	2.17	12	— 0.67	0.84	24	246.6
Blenheim	12	59.8	— 3.3	79.0	41.6	5.30	10	+ 3.31	2.49	26	235.0
Hokitika	12	59.2	+ 1.1	77.0	39.2	5.27	7	— 4.45	2.62	2	280.3
Hanmer	1225	56.0	— 3.7	79.0	35.0	13.99	19	+ 10.46	4.92	24	160.1
Christchurch ..	22	59.3	— 2.1	81.9	39.9	2.83	11	+ 0.60	1.01	22	199.0
Ashburton	323	58.0	— 3.0	83.8	39.8	4.59	15	+ 1.96	1.14	24	168.9
Timaru	56	58.0	— 2.6	79.8	40.8	2.52	15	+ 0.15	0.68	22	178.7
Alexandra	520	61.8	+ 0.1	86.1	35.0	1.60	6	— 0.24	0.77	11	258.3
Taieri	80	56.5	— 1.3	85.0	36.8	3.78	16	+ 1.40	1.56	11	185.2
Invercargill ..	0	55.0	— 1.2	79.3	31.2	2.45	13	— 1.28	0.82	21	200.8

Show Dates

THE following are dates and venues of A. and P. shows:—

March

- *21 March—Cheviot A. and P. at Cheviot.
- 21 March—Mayfield A. and P. at Mayfield.
- 23 March—Wellsford A. and P. at Wellsford.
- 28 March—Mawarden A. and P. at Hawarden.
- 28 March—Methven A. and P. at Methven.
- 28 March—Flaxbourne A. and P. at Ward.

April

- 6 April—Mackenzie County A. and P. at Fairlie.
- 6 April—Strath-Taieri A. and P. at Middlemarch.
- 11 April—Oxford A. and P. at Oxford.

* The Department of Agriculture exhibit will be staged at this show.

Producing Beeswax in the Domestic Apiary

Seasonal Notes for the Domestic Beekeeper

THE honey flow will now have ceased in most districts and domestic beekeepers will have extracted and packed most of their surplus honey. Attention should now be turned to cleaning up about the apiary, and in this article T. P. J. Williams, Apiary Instructor, Department of Agriculture, Hamilton, describes methods of rendering cappings and bits of comb into beeswax.

IF the domestic beekeeper still has honey to remove from hives, great care should be taken not to leave them open too long or to leave any honey exposed, as at this time robber bees become a menace. Where it is necessary to open hives it should be done as quickly as possible to prevent robbing being started, because it is much easier to prevent robbing than to check it once it has started.

Where the entrance had been enlarged for hot weather the blocks should now be removed and the entrance reduced to its normal width so that the guard bees may be able more readily to cope with robbers.

Saving Pieces of Comb

The domestic beekeeper has a good source of beeswax, though perhaps few realise it, for wax is available from cappings, burr combs, brace combs, old discarded combs, and frame and hive scrapings. All of these pieces of wax should be saved until enough is available to warrant melting down.

A large quantity of wax is wasted each year through the want of some inexpensive method of converting it. Old combs and pieces of wax thrown into heaps and allowed to become infested with wax moth form a good breeding ground for them and constitute a breach of the Apiaries Act and Regulations, because under the Act wax moth, which can be very destructive, is proclaimed a disease.

Beeswax is a valuable by-product of the apiary, about 10 to 15lb. of honey being consumed in producing 1lb. of beeswax, as the bees have to gorge themselves with honey and cluster together until it is digested and exuded from the under portion of the abdomen in the form of wax scales.

Constructing a Melter

The melter to be described is a model of the Dunstan wax melter. It is made from a tin about the size of a 10lb. honey container. The top of the container is cut out, leaving the rim. An overflow channel has then to be made from a piece of flat tin. The circumference of the container is marked out on the piece of tin, but this mark should be altered from a circle to an oval so that the diameter measured one way will be about ½in. greater than measured across the original circle.

After the centre piece of tin has been cut out and discarded the oval piece is soldered to the outside of the container, about 1½in. from the rim on one side and sloping away to about 3in. from the rim on the opposite side. It is then trimmed off to a width of 1in., but at the lowest level of the channel a spout is made by leaving an extra inch. A ½ to 1in. metal strip is then soldered to the outer edge to form a channel to take the overflow.

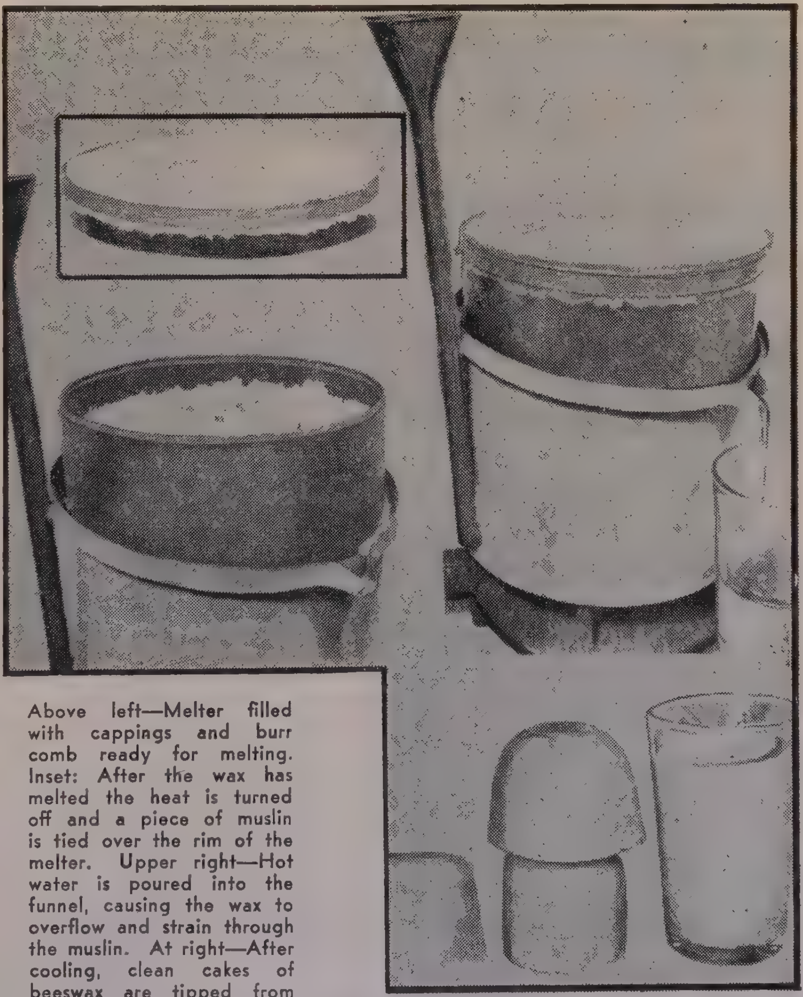
A ½in. hole is cut in the container near the bottom and an upright ½in. tube is fitted as illustrated. The tube should be about 2in. higher than the container and have a filling funnel attached to the top.

Rendering the Comb

Place enough water in the container to cover the inlet hole near the bottom of the tin. Fill the melter with the comb or cappings to be melted and place it over a source of heat. When heating is carried out over a naked flame care should be taken that the wax does not boil over and start a fire. It is not desirable to boil the wax, but the beekeeper should make sure that all the wax has melted.

The container is then removed from the heat and a piece of muslin is tied tightly over the top. Hot water is poured slowly into the filling funnel, causing the wax to overflow, strain through the muslin, and run down over the side of the tin into the overflow channel and from there into the desired moulds.

When bubbles of water begin to come through the muslin this is an indication that most of the wax has been secured. The straining cloth may then be removed and the rubbish in the melter tipped into a hole in the ground and covered over. Next morning the cakes of wax should readily tip out of their moulds provided all containers used taper slightly toward the bottom, such as a cup or jelly jar.



Above left—Melter filled with cappings and burr comb ready for melting. Inset: After the wax has melted the heat is turned off and a piece of muslin is tied over the rim of the melter. Upper right—Hot water is poured into the funnel, causing the wax to overflow and strain through the muslin. At right—After cooling, clean cakes of beeswax are tipped from the moulds.

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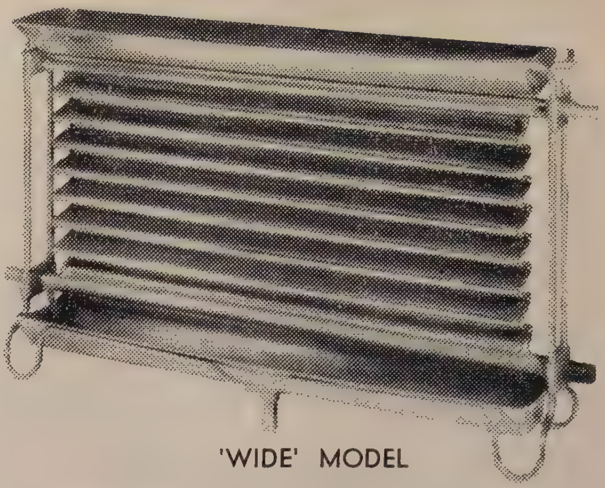

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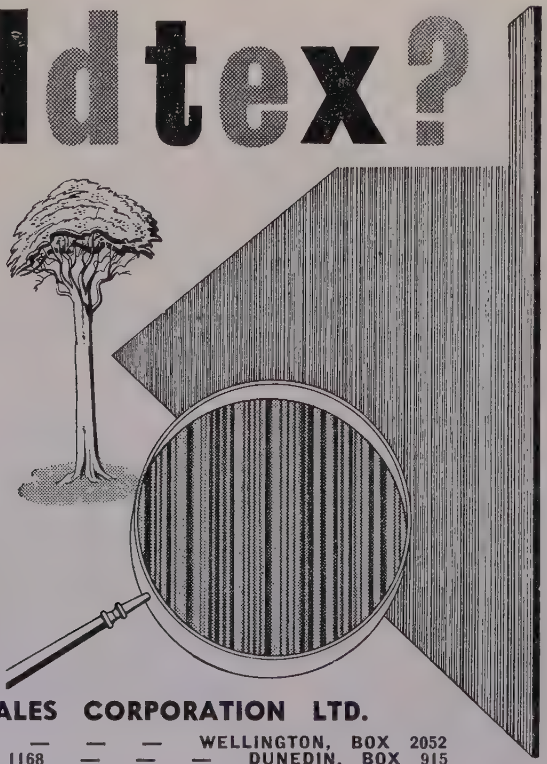

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Getting More Eggs in Winter from Household Poultry

THE winter egg is the valuable one to produce. Eggs reach the highest price of the year during winter and can represent a substantial item in the household budget where there is a large family of children. They are a valuable food and cannot be dropped from the diet just because they are expensive. Consequently many household poultry keepers are keenly disappointed when they get few or even no eggs from their birds during this period. Good winter egg production is possible, but greater attention in detail must be paid to management than is usually given if this is to be achieved. This article by the Animal Industry Division reviews some of the more important points necessary to obtain satisfactory winter egg production.

This house gives excellent ventilation and light for birds. There is ample run space, the bushes provide shade in hot weather, and the house is well sheltered.

IT is frequently stated that winter egg supplies come almost solely from the commercial egg producer who has both the skill and the equipment to get eggs out of season. There is considerable truth in this statement, because too few household poultry keepers have the knowledge of how to handle their birds satisfactorily before and during winter. Good winter egg production depends on a number of factors. First it must be recognised that it is not natural for birds to lay heavily during winter; the natural peak production period is spring—September, October, and November. Though good winter egg production is practicable, it is not reasonable to expect as many eggs in May, June, and July as will be obtained in spring.

Factors Affecting Winter Production

Of the numerous factors which affect winter egg production the following are perhaps the most important:—

Housing

Good housing, which by some householders is considered costly and even palatial, is not recommended without good reason. If birds are to lay through winter, they require a first-class environment, including dry conditions, freedom from cold draughts but with adequate ventilation, and the maximum of light during the shorter, winter days. Poorly constructed houses in exposed positions which let in rain and are cold at night are useless for birds in winter. Birds require comfortable conditions without coddling. During wet weather outside runs are often detrimental to health and production during winter.

Dry Litter

A good depth of dry litter (6 to 8in. of straw, wood shavings, or sawdust) is important. It is essential that this depth of litter should be built up well before winter sets in. Once the damp atmosphere of winter starts, henhouses should not be cleaned out unless it is essential. Fresh litter put into a laying shed during winter is very liable to take up moisture and become damp. Dampness in the laying shed leads to colds, which are fatal to winter egg production. Consequently poultry keepers should start now to build up ample litter on the floor where the new season pullets are coming into lay. Apart from being an aid to winter egg production this extra litter will make valuable compost for the garden when no longer required for the birds at the end of the laying season.

Reminders for April

Pullets should now be comfortably settled and coming into production. Ensure that they receive an adequate supply of good greenfeed. If this is not available, fish oil should be included in their mash.

If this season's pullets are not progressing satisfactorily and have not been dosed for worms, give each pullet a 2 c.c. capsule of carbon tetrachloride.

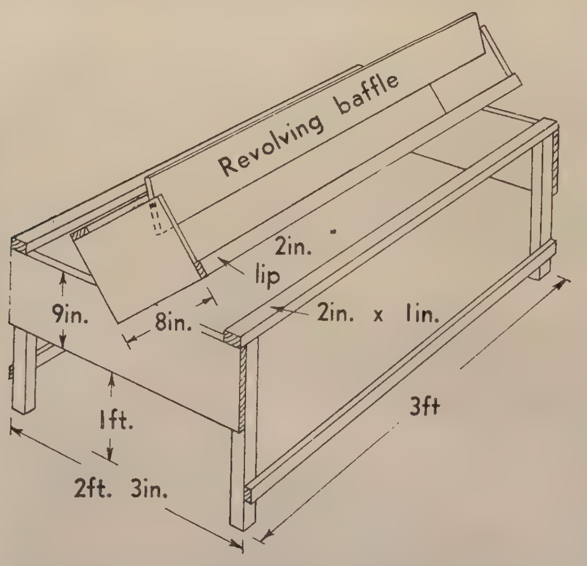
Litter in the laying shed must be built up to a good depth (4 to 6in.) during autumn and before the damp, winter weather starts.

Do not be alarmed if pullets when coming into lay drop a few shell-less eggs at night while on the perches. Providing the pullets always have oyster shell or some other good shell grit, they will not lay shell-less eggs at night for long.

Stock

The class of bird kept is a major factor in winter egg production. Other things being equal heavy breed birds such as Australorps tend to give better winter egg production than light breeds, although the total egg production for the year may be similar. Many household poultry keepers have a prejudice against heavy breeds because of broodiness in them and the additional trouble of breaking a bird of broodiness. Such poultry keepers would do well to consider the winter egg production advantage, which can more than offset the additional work caused by broody hens later in the season.

A considerable proportion of household poultry keepers hold their birds for more than one laying season; some go as far as holding them for several seasons. This can have a most important effect on winter production. Pullets which lay well in their first season and do not go into a moult until autumn will not come back into lay in winter. Under average household poultry conditions such birds do not produce their first eggs until well into July. Further, birds in their third or fourth laying seasons are likely to be still later in producing eggs after the annual moult. "Old stagers" are generally useless for winter egg production and in consequence often cause disappointment. To get a satisfactory supply of eggs in winter well-grown pullets are the best class of bird to keep. Again, it is wise to avoid buying late-hatched (late October, November onward) pullets. Such birds often develop slowly and come into production at a disappointingly late date,



Hopper recommended for use in dry mash feeding.

particularly heavy breeds. Again a warning is given not to leave until late in the year the ordering of replacement pullets. The hatching season starts in July and orders should be placed then for delivery at the end of the year, if the poultry keeper wants to avoid getting tail-end-of-the-season culls and late-hatched birds. Such stock is unlikely to give good winter egg production.

Feeding

Good feeding is undoubtedly a factor in winter egg production and it is to be hoped that the old idea that care must be taken not to overfeed birds has long since been forgotten. It is customary to feed mash and grain; some feed the former as wet mash, others in dry form. Whether mash is fed wet or dry, under normal circumstances, will have little or no effect on winter egg production. Of considerable importance, however, is whether the householder feeds standard laying mash No. 1 or No. 2. No. 1 laying mash contains the essential ingredient meat meal, but none of this is included in No. 2. In some districts No. 1 mash mainly is on sale, but in others householders will be given No. 2 laying mash unless they stipulate No. 1 and make sure that they receive it. Winter eggs cannot be produced on No. 2 laying mash unless at least 15 per cent. of meat meal is added to it. This means purchasing meat meal separately and adding just over 1½lb. of the meal to every 10lb. of No. 2 laying mash.

As an aid to winter egg production the following programme of feeding is suggested.

First feed (early morning): Small amount of wheat or mixed grain.

Midday: As much wet mash as the birds will clean up in 20 minutes.

Last feed (late afternoon): Good feed of wheat or mixed grain.

In addition the laying house should contain a dry mash hopper similar to the one illustrated at left. The hopper should have a wooden division dividing it into a two-thirds and a one-third section. Dry mash should be placed in the larger section and meat meal in the smaller. Birds should have access to the hopper feed all day, as this will ensure that they get ample food. The additional meat meal eaten will stimulate winter egg production. The wet mash feeding should be confined to the winter period — May to mid-August — and can be discontinued in spring — late August onward. Toward the end of autumn and during winter it becomes increasingly difficult to find adequate supplies of greenfeed for birds. Moreover, the greenfeed available is often of poor quality. In addition to giving a good colour to the yolks of eggs greenfeed supplies highly essential vitamin A. As the quality of the greenfeed deteriorates in winter so does the vitamin A content fall, and the supply of vitamin A to the birds decreases.

A lowering of vitamin A intake by birds has a definite adverse effect upon winter egg production.

Vitamin A deficiency can be rectified by mixing 3 tablespoons of a feeding fish oil with every 10lb. of dry mash. Feeding fish oils, which may be obtained from most firms which sell poultry foods, are today recognised as an essential for birds—young and fully grown—when supplies of greenfeed are short or the greenfeed is of inferior quality.

Winter Lighting for Layers

Carefully carried out experiments and then many years of practical experience have shown that artificial lighting for laying birds during winter leads to increased production during that period, though not necessarily more eggs over the complete laying season. For many years it was thought that the increase in winter egg production when artificial lighting was used to lengthen the total hours of light resulted from birds eating more food than was possible during the short days of winter. Now it is known that the major factor in increasing production is the light, which stimulates the birds' pituitary glands. As it may be a practical proposition for some householders to fix an electric light in their laying sheds, the following details of lighting for laying birds are given.

The simplest and an effective method is to bring a light on in winter about 2 to 3 hours before there is natural light. The object is to give the birds 12 to 13 hours of natural and artificial light in every 24 hours. As artificial lighting should be begun about May, the period of such lighting must be increased up to the shortest day.

Lighting in this manner can be effected with an alarm clock and an ordinary tumbler switch, the key of the alarm on the clock being used to strike the switch, from which the spring is removed. The key knocks the switch down. The light can be put off when the grain is fed by the householder before breakfast.

The light, which can be a 60-watt lamp, should be in a cone-shaped metal reflector approximately 16in. in diameter and 4in. deep. The lamp and reflector are placed centrally in the laying house and should be hung approximately 6ft. above the floor. It is essential that the light should shine on the water trough and food hopper, preferably a dry mash hopper as already mentioned. It is not necessary for the light to shine directly on to the perches. The birds will come down from the perches readily as soon as the light shines on to the floor.

As the whole object of lighting is to stimulate additional winter egg production and as more food is needed to produce the extra eggs, it is essential that food is available when the lights go on.

In winter particularly birds react adversely to sudden changes of management. Consequently it is essential not to subject them to a long period of lighting suddenly. It is equally important that at the end of winter (end of August) lights should not be cut off suddenly. Birds should have a short period of artificial light at first, the period should be increased gradually each week by altering the alarm clock, and then lighting should be decreased by stages toward the end of winter before it is cut off. Unless this done, there is a serious risk of throwing birds into a moult.

Artificial lighting in this manner is not expensive, initially or in current consumed, and is a proved method of increasing winter production.

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THE Technical Correspondence School of the Education Department offers a wide range of courses for students who cannot attend classes because of such reasons as distance, hours of work, or ill-health, and for members and ex-members of the armed forces. The courses include subjects directly or indirectly concerned with agriculture and horticulture, as well as covering a large number of trades and technical professions.

The principal courses in agriculture cover dairy, sheep, and arable farming and there are short courses in farm bookkeeping, milk, biology, and concrete.

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Further information may be obtained from the Principal, Technical Correspondence School, 29 Wallace Street, Wellington S1.

Citrus and Sub-tropical Fruits for the Home Garden

By N. B. CONGDON, Horticultural Instructor, Department of Agriculture, Auckland

CERTAIN citrus and sub-tropical fruits are worth a place in any home garden, if only because of their health-giving properties and enjoyable flavour. Climate, however, largely governs the locality in which they can be grown. Sub-tropical fruits such as passion fruit, tree tomatoes, feijoas, and Chinese gooseberries add variety to the everyday fruits grown. They are becoming increasingly popular with domestic growers both for dessert purposes and in cooking, where they are often used for flavouring. In this article advice is offered the home gardener on choice of suitable varieties and successful culture.

THESE fruits are confined mainly to the more frost-free parts of the North Island, but frost tolerance varies according to species.

Recognised citrus areas are confined mainly to the relatively frost-free belt from Wairoa and Gisborne through the Bay of Plenty and up the east coast as far as Mangonui, North Auckland. Within this belt there will be situations which are not frost-free and which are too risky for growing citrus, and outside the belt there will undoubtedly be isolated areas where citrus can be grown without risk of damage. The same applies to tree tomatoes and passion fruit, which, being extremely frost-tender plants, are also more or less confined to this belt. In home gardens which experience only light frosts the risk of damage to young trees, which are most susceptible, may be lessened by protecting the trees throughout the winter by a framework supporting a suitable covering material such as scrim, light calico, or canvas. As trees become bigger such protection becomes impracticable and is usually not necessary, as older trees are more able to withstand frost damage.

Feijoas are hardier than most sub-tropical plants and it should be possible to grow them successfully in home gardens in nearly all districts in New Zealand except for situations which experience excessive frost or rainfall or where soil conditions are unsatisfactory.

Being deciduous plants, Chinese gooseberries will stand quite heavy winter frosts, but they are very susceptible to damage by late frosts when new growth is commencing during September and October. It would therefore be unwise to plant them in situations subject to frosts during this period. Light winter frosts are said to be beneficial in improving the flavour of fruits on the vine.

Soil and Shelter Requirements

Citrus and sub-tropical fruits thrive on a deep, friable soil which is rich in humus. Good drainage is essential. In situations where such soil does not occur naturally, attempts should be made to improve the existing poor or heavy soil by the addition of humus-building materials such as green cover crops or compost. Blue lupins grown in a home orchard during winter and dug just after flowering are an excellent means of improving the humus and nutritional content of the soil.

Where drainage is poor, improvements should be made by either open or tile drains, preferably before planting, to ensure that excess water will be freely removed during winter. On the other hand a continuous supply of moisture is necessary during summer, as these fruits do not thrive under drought conditions.

Citrus and most sub-tropical fruits require adequate shelter from winds. Feijoas are a little more tolerant.

HEADING PHOTOGRAPH: Meyer lemon of 4 years' growth. Sparrow Industrial Pictures Ltd. photo.

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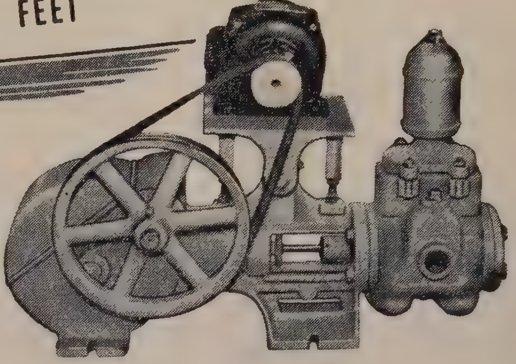

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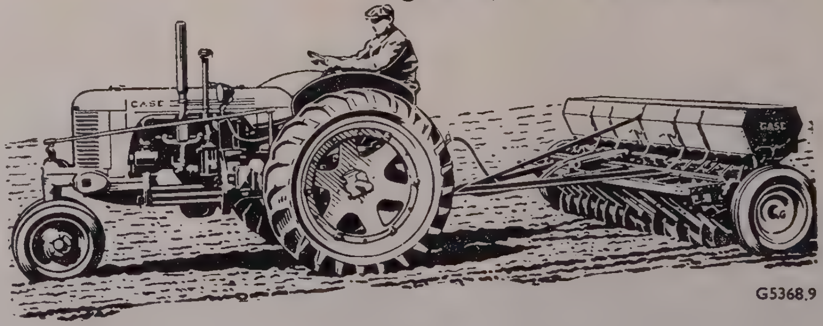

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Buildings often afford sufficient shelter in a domestic garden, but hedges should be provided for exposed situations. An 8 to 10ft. hedge on the windy side of a home orchard should prove adequate for most localities. Suitable hedges may be provided by *Ligustrum vulgare* (small-leaved privet), *Abelia floribunda* or *Escallonia exoniensis* (white flower). *Olearia fosterii* (golden ake ake) is very suitable for colder localities and *Tecoma capensis* is an excellent quick-growing hedge suitable for warmer areas.

Citrus

Citrus fruits, the better known of which are lemons, oranges, grapefruit, and mandarins, are very popular both for dessert and culinary purposes. The trees themselves are quite attractive and are often grown on lawns and in conspicuous places in a home garden for their ornamental value.

Citrus trees require good growing conditions, and adequate attention to these needs all the year round is necessary for their success. Being evergreens they are more subject to the effects of extremes in weather.

Lemons

Two kinds of lemon are commonly grown, the standard varieties such as the Lisbon and Eureka and the Meyer lemon, which is probably a cross between a lemon and an orange and is less acid than standard varieties. For this reason the standard lemon, of which the thornless Eureka type is more suitable for the home garden, is generally preferred by the housewife for culinary purposes. The Meyer tree has a double advantage of being more dwarf growing and more frost resistant. Its greater frost tolerance enables the Meyer to succeed in more southern districts where heavier frosts may be experienced. Standard lemons carry mature fruit all the year round, but the Meyer is seasonal, with most of the fruit ripening between June and October.

[*Sparrow Industrial Pictures Ltd. photo.*

Wheeny grapefruit planted 4 years.

Grapefruit

Two varieties of grapefruit, the New Zealand Grapefruit (Morrison's Seedless strain) and the Wheeny, are recommended for the home garden. The fruit of the New Zealand Grapefruit, which is flattish and medium sized with thin, orange skin, is suitable for marmalade making in June and July and for dessert from August to October or later. When fully mature the Morrison's attains an excellent sub-acid flavour and is popular as a fruit drink. When the fruit is sliced in halves and sprinkled with sugar the pulp can be eaten with a spoon and it makes a good breakfast dish.

The Wheeny grapefruit tree bears large, thin-skinned, pale lemon fruit which ripens from November to January. A characteristic of this variety is the puckered leaves. A disadvantage of the Wheeny is its biennial cropping habit; one year a heavy crop of fruit may weigh the branches down to breaking point and thus call for propping, and the following year there may be little or no fruit. The variety is more frost tender than the Morrison's and requires warmer and more protected situations.

Sweet Oranges and Mandarins

Given the best possible growing conditions in a home orchard, sweet oranges and mandarins can provide the household with most enjoyable kinds of fruit while most other fruits are scarce or out of season.

Most sweet orange trees, including those mentioned on page 229, mature their fruit over 2 to 3 months some time between August and November, depending on variety. Later-maturing varieties are grown, but these are not recommended, as in general their performance has not proved satisfactory in New Zealand. Satsuma mandarins mature their fruit earlier than any other citrus, usually from about June until August. The season of other mandarin varieties largely corresponds with that of sweet oranges.

The choice of rootstock for sweet oranges and mandarins is important.

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A well-grown young mandarin tree.

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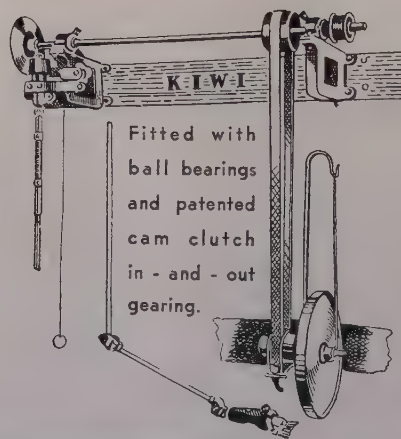

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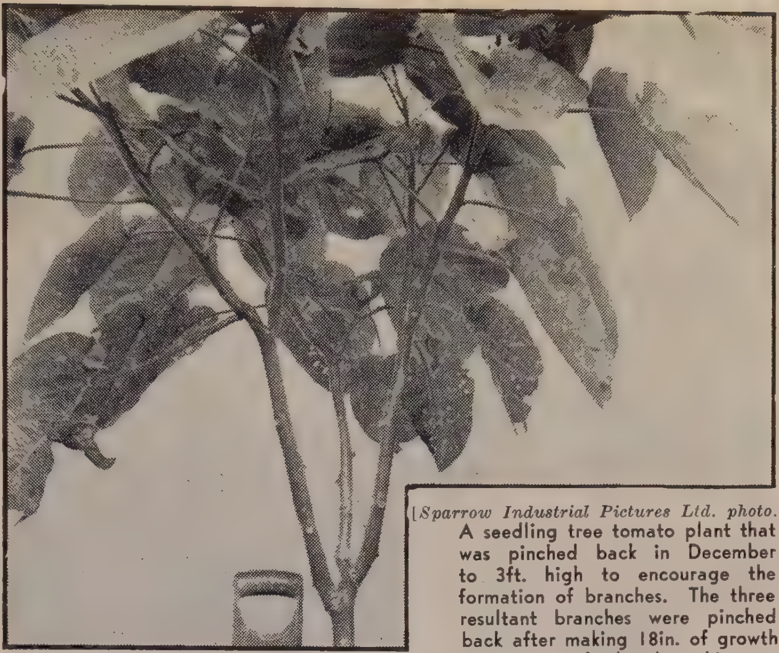
Recommended sweet orange varieties which do best on the *Trifoliata* stock are Carters Navel, Ruby Blood, and selected strains of Best's seedless. Robertson Navel and Golden Nugget are also recommended for smaller trees suitable for ornamental purposes.

Mandarins can be grown quite successfully in warm positions well sheltered from winds and are best propagated on the *Trifoliata* stock. Varieties recommended are Satsuma (Silverhill and Wase strains), Clementine, and Kara (a late-maturing variety).

Sub-tropical Fruits

A number of sub-tropical fruits can be grown successfully in New Zealand, but they are confined mainly to the milder parts of the North Island. Passion fruit, Chinese gooseberries, tree tomatoes, and feijoas are by far the most common sub-tropical fruits cultivated, though others such as guavas, loquats, figs, avocados, fruit salad plants (*Monstera deliciosa*), mountain pawpaws, and cherimoyas are grown successfully in some localities. Only the four most common ones will be discussed in this article.



[*Sparrow Industrial Pictures Ltd. photo.*

A seedling tree tomato plant that was pinched back in December to 3ft. high to encourage the formation of branches. The three resultant branches were pinched back after making 18in. of growth to cause further branching.

Tree Tomatoes

Tree tomatoes have become popular because of their many uses both as a dessert and culinary fruit. As with some other less-known fruits, taste for the tree tomato must be acquired. Many people are just beginning to appreciate fully the flavour of this fruit, which may seem at first taste to be a little too acid. As the tree tomato ripens during May to October, it has a long fruiting season and is welcome at this time when many other fruits are out of season.

Tree tomato plants will grow from either seeds or cuttings and under suitable soil and climatic conditions they will begin bearing within 18 months of planting out.

Plants grown from seed generally develop with a straight main stem which branches naturally at 5ft. or 6ft. from the ground. The height of the branching can be decided by pinching out the top growth at the desired height (see illustration on this page). Thus it is possible to produce a lower-branching tree which bears fruit and foliage at a more accessible level and which is less susceptible to wind damage.

Cuttings produce low, bushy plants which generally branch at ground level. The home gardener should select a type of tree to suit his particular conditions of shelter, using cuttings for exposed positions and seedlings for more sheltered places.

The habit of growth of the plant with its large leaf surface and brittle wood makes the tree particularly susceptible to wind damage and adequate protection from wind is essential. Situations close to the sunny sides of sheltering hedges or buildings favour the plants.

Two main varieties of tree tomato, the yellow and the red, are in common use. The red is the more popular for commercial uses, owing to its more attractive colour. The yellow variety, though perhaps not as attractive in appearance as the red, is less strongly flavoured and is considered more palatable. The yellow is generally

Passion fruit vine. [*R. W. Orr photo.*

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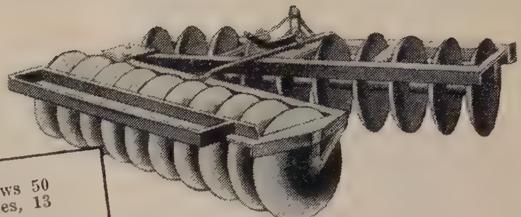

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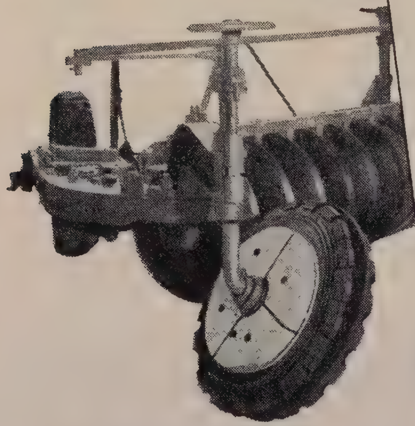

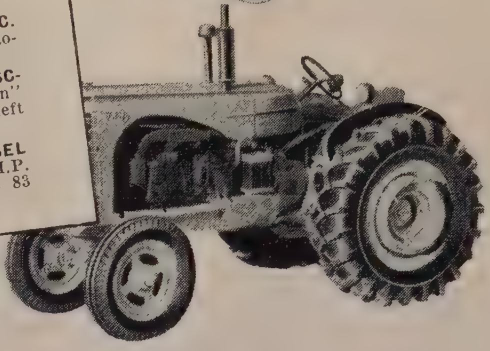

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If the home gardener desires to raise his own plants, he should select seed from disease-free trees which bear heavy crops of fruit of a desirable type. Cuttings may be taken at any time of the year, but preferably during autumn or early spring. Suitable cuttings should be 18 to 30in. long and secured from 1- or 2-year-old wood which is between ½in. and 1in. in diameter. All leaves should be removed and the cutting set about a third of its length deep into rich soil which is kept firm and moist.

Once the framework is established, a young tree tomato tree requires pruning to produce strong new growth each spring. The fruit is borne on the current season's growth; hence, if left unpruned, the fruiting wood gradually extends outward from the ends of branches and laterals, leaving the centre more or less barren. In so doing fruiting wood becomes less vigorous, resulting in reduced fruit quality, and many breakages occur because branches and laterals cannot carry the weight of the crop.

Tree tomatoes may be pruned at any time from early spring up to October or November. Larger branches should first be thinned out where necessary to prevent overcrowding and the remainder shortened back toward their bases to promote strong new growth. Dead wood should also be cut back to healthy tissue. Second, spent fruiting wood should be shortened to encourage new growth.

Passion Fruit

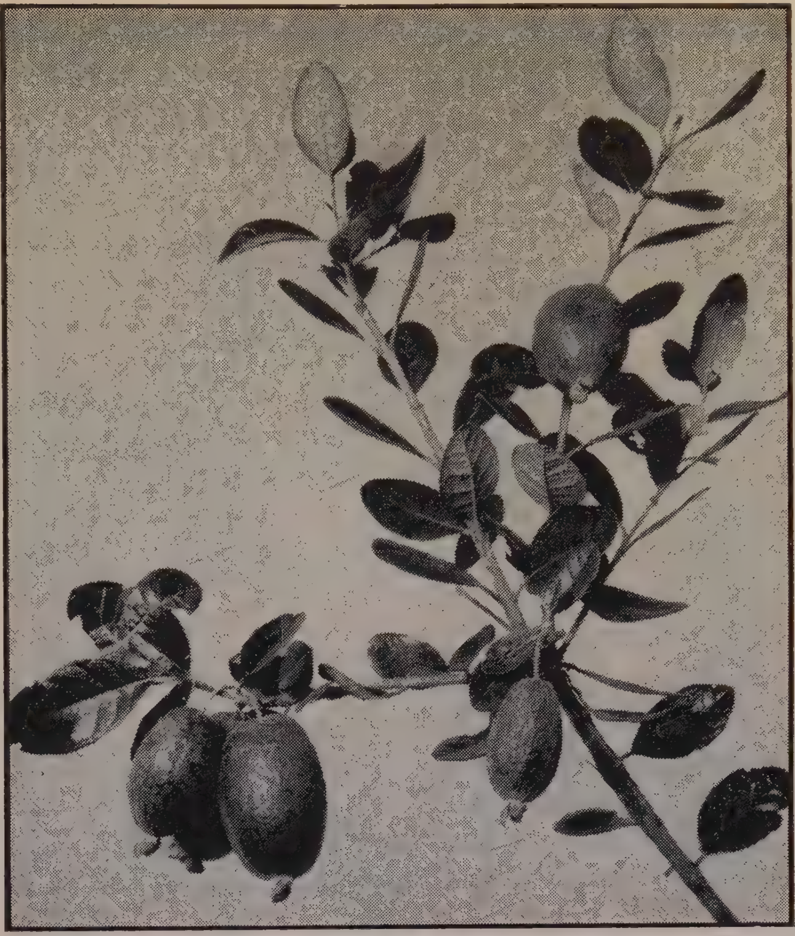
Passion fruit vines are popular in home gardens because of the many dessert uses of the delicately flavoured fruit. Vines usually do well in a warm position against the sheltered side of a shed or house or on a trellis erected in a sheltered part of the garden. A strong trellis 4 to 6ft. high with wires spaced at intervals of 15in. to 24in. is very satisfactory.

Passion fruit plants are propagated from seed. Home gardeners who intend to grow their own plants should be sure to select seed only from a vine which crops well and bears a desirable type of fruit. Fruits vary considerably in size and amount of pulp. The smaller purple type is generally preferred to the large Mammoth variety, which is often incompletely filled with pulp.

Light manuka or bamboo stakes are necessary to provide vertical support to the young passion vine leaders. As the plant grows, the leaders or runners must be trained up these stakes and along the horizontal wires. One or two runners may be trained along each wire on each side of the stake. Wire netting is not recommended for training the vines, which soon become entangled and thus cannot be properly pruned.

Plants will begin bearing fruit during the second summer and winter about 15 months after planting. They generally bear a main crop which ripens from February to April and sometimes a smaller, off-season crop during September and October.

Vines should be pruned during the spring, preferably in October. Pruning is necessary to keep the vines open and vigorous. If they are left unpruned, a mass of tangled growth usually results, leaving little possibility for the penetration of sprays, which are important to control diseases and pests. The passion vine bears its fruit on the current season's growth; thus, if the vine is left unpruned, the bearing surface is further and further removed from the main stem and adjacent vines become intertwined. This results in reduced vigour of the plant and quality of the fruit. The vine should be kept as open as possible by shortening back the original leaders (or main runners) and constantly pruning off the worn-out laterals (or side growths) each to a bud near their bases. When leaders are being shortened they should always be cut back to a young side growth, because older leaders tend to die back if cut to a dormant bud.



[*Sparrow Industrial Pictures Ltd. photo.*

A small branch of feijoa. The largest fruit is about two-thirds normal size and is not mature.

Feijoas

Feijoas have a unique flavour and are rapidly gaining in popularity, principally as a dessert fruit.

Being evergreen shrubs, feijoas have an ornamental value for home gardens and their comparative hardiness makes them suitable as hedge shrubs, where they can provide shelter from wind as well as plentiful supplies of fruit.

There are a number of recognised varieties available, the best of these being Coolidgei, Mammoth, Superba, and Triumph. Feijoas fruit better when two or more varieties are planted together, owing to the beneficial effects of cross-pollination. The variety Coolidgei is the only one known to be definitely self-fertile and will crop satisfactorily on its own.

Feijoas may be propagated by seed, cuttings, layers, or by grafting scions from selected trees on to seedling stocks. Seedling trees show much variation in the size and shape of fruit, which is often of inferior quality, and for this reason trees grown by the other methods are preferable.

In raising plants from cuttings lateral growths 4 to 8in. long should be removed from the parent tree complete with a heel and 2 to 6 end leaves left attached. They will root readily in a light, sandy, well-drained loam. Rooting is more readily obtained during winter in northern districts; late autumn or early winter, before the onset of cold weather, is suggested for more southern districts.

Pruning is not an important consideration except for the early establishment of a strong and well-balanced framework.

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Fruit matures about mid-April and continues to ripen during May. It should not be picked from the tree, but left until it falls. The fruit attains maximum flavour and aroma when it has changed to a yellowish green and it has become slightly soft. Feijoas may be eaten raw as dessert or in salads, or they may be cooked in a variety of ways.

Chinese Gooseberries

Chinese gooseberries, which ripen from May to July, make a welcome addition to the limited kinds of fruit then available. The fruits, which are unattractive in appearance, have a rich, delicate flavour when ripe and can be used for dessert, jam, and chutney. The Chinese gooseberry is a very vigorous-growing vine which soon becomes a tangled mass of growth if left unpruned. For this reason the home gardener should ensure that adequate space is available before he attempts growing this fruit. Vines should be regularly pruned and trained.

A solid framework for support is required and fences or pergolas are generally used. Vines are a little easier to manage and maintain on a fence, but both types have their disadvantages.

There are no recognised named varieties of Chinese gooseberries, but there are a number of strains which vary considerably in the shape, size, and quality of the fruit. Superior strains have larger fruits and lack the hard, woody core of some strains.

Chinese gooseberry plants are self-sterile, vines being either male or female. To obtain fruit, which is borne only on female plants, it is therefore necessary to have at least one plant of each sex. It may be possible to obtain a female plant with a male scion grafted on for pollination, and where there is a shortage of space in a home garden this would be the most satisfactory arrangement. Vines usually crop satisfactorily 3 years after planting.

In training a Chinese gooseberry the aim should be to establish main vines along the wires on each side of the main stem, or at equal intervals of about 2ft. over the pergola, if this is the framework used.

Fruit is borne on the current season's growth produced from the first 4 or 5 basal buds of 1-year-old laterals which have grown from the main vines. Pruning consists of the removal each winter of about half of these 1-year-old laterals, shortening the remainder to between 4 and 6ft., and tying them down in a bow shape. The growths from laterals tied down the previous winter should be shortened to their first 4 buds for fruiting the following season. This may be done during the winter pruning, but is best delayed until January. Fruiting laterals tied down 2 or 3 years previously should be cut back to the main vines to allow the new, vigorous laterals to take their place.

If a vine, through neglect, has become out of control and developed a tangled mass of growth, drastic thinning out of all wood is the only way to re-establish an orderly framework.

Good fruit on a pruned Chinese gooseberry vine.

Planting

Orders for citrus and sub-tropical trees and plants should be given early in the year to a reliable nurseryman. Delayed orders often result in disappointment through non-fulfilment of the order or receipt of a poorer grade or variety of tree. Two-year-old citrus trees generally prove most satisfactory and these should be strong and well branched. Other sub-tropical fruits may be either 1 or 2 years old at planting out.

Bulletins on Sub-tropicals

FOR fuller information and as permanent references for the successful and profitable culture of sub-tropicals mentioned in this article the following Departmental literature is recommended:—

Bulletin No. 310, "The Home Orchard".

Bulletin No. 349, "Chinese Gooseberries, Their Culture and Uses".

Bulletin No. 306, "Tree Tomato Culture".

Bulletin No. 135, "Passionfruit Culture".

Bulletin No. 20, "Recognition and Control of Citrus Pests and Diseases in New Zealand".

Bulletin No. 96, "Lemon Culture".

Bulletin No. 241, "Culture of N.Z. Grapefruit, Orange, and the Mandarin".

Bulletin No. 303, "The Propagation of Citrus Trees".

Also "The New Zealand Journal of Agriculture", April 1952, "Culture of Feijoa Trees", F. L. Bailey, pp. 291-296.

Trees should be planted in their permanent positions as soon as possible after their arrival from the nursery. In the meantime they should be unpacked and heeled in without delay in a cool position in the garden. Planting can be carried out from June onward in the warmer localities, but should be delayed to early spring in the colder areas.

Planting distances vary considerably owing to the habit of each kind of plant. Tree tomatoes and feijoas should not be closer than 12ft.; citrus would require 12ft. to 18ft. between trees, depending on variety, rootstock, and growing conditions. Required planting distances are least with oranges and mandarins on *Trifoliata* rootstocks. Increased distances are necessary for trees on sweet orange or citronelle rootstocks; New Zealand Grapefruit and Wheeny grapefruit trees require the greatest spacing. Chinese gooseberries should be planted 15ft. to 20ft. apart and passion fruit 10ft. to 12ft. apart if grown on a fence.

Holes for trees and vines should be dug some time before planting. After the topsoil has been removed the subsoil should be broken up with a spade to a depth of about one spit and some of it removed and replaced by topsoil. Well-rotted organic matter such as compost or leafmould as well as a little animal manure should then be added. Finally, 1lb. of blood and bone manure lightly forked into this new soil at the bottom of the hole will help to provide, with these other materials, the best possible growing medium for the young roots of the new plant.

Citrus trees and sub-tropical plants are usually received from the nursery with the roots balled and at planting the ball should be gently broken if it has become hard. Trees should be set at the same depth as they were in the nursery. This will be indicated by the soil mark on the trunk.

Gently arrange the roots so that they lie evenly within the bottom of the hole, making sure that none is doubled back or cramped against the wall of the hole. Any roots that are too long to be arranged satisfactorily should be trimmed back. Fill in with topsoil directly around the roots and make sure that the tree is firmly fixed by treading in the soil. Add the final layer by digging in topsoil from around the tree.

Staking is sometimes necessary to support young trees, especially tree tomatoes, in situations where wind may be troublesome.

Cultivation and Manuring

Citrus and sub-tropical fruits have very shallow rooting systems. Cultivation should therefore be confined only to the first few inches of topsoil. Surface weeds should be regularly hoed out, especially during summer, when there may be competition for moisture during drought periods. Care is necessary not to damage the roots or trunks of trees during this operation. Mulchings of straw or hay will help to suppress weed growth as well as to conserve moisture and add humus, but this material should not be heaped against trunks of citrus trees, as this encourages certain bark diseases.

Citrus and sub-tropical fruits are lovers of humus and humus-building materials should be regularly applied. Leafmould, grass clippings, compost, and even organic wastes from the household help to maintain the humus content in the soil. Artificial fertilisers should be used to augment natural manures and should be applied annually. For citrus and sub-tropical fruits a mixed fertiliser containing 5 parts of blood and bone, 4 parts each of "super. compound" and sulphate of ammonia, and 1 part of sulphate of potash should be applied at a rate proportional to the size and vigour of the plant. Fertilisers should be applied each spring from the year after planting. Citrus trees at this stage would generally require 2 to 3lb., but applications thereafter will need to be increased by approximately 1lb. per tree each year with a maximum of about 15lb. for large, fully bearing trees. Sub-tropical plants would generally require less of this mixture, depending on their size and vigour. Fertilisers should be applied to the root zone (6 to 12in. from the trunk extending out to the spread of the branches) and lightly hoed into the surface soil.

Control of Pests and Diseases

Most important in the successful culture of fruit trees in the home garden is pest and disease control. Much fruit produced in home gardens is of poor quality and appearance due to lack of attention to this.

Fortunately there are few pests and diseases which are at present troublesome with sub-tropical fruits other than citrus. Brief details and mention of control measures for the most important of these are as follow:—

Powdery mildew is the most common tree tomato disease. It causes greyish white patches on the stalks and undersides of leaves. If the disease is unchecked, widespread infection may cause severe defoliation.

Control of this disease is not difficult and may be effected with lime sulphur sprays. For 4 gallons of spray add ¼ pint of lime sulphur to the required amount of water. Applications should be started in spring at the first sign of infection and continued at 3- to 4-weekly intervals until control is secured.

Virus infection is also common in tree tomatoes, but often no great harm is caused. Spraying has no effect on virus and if infection becomes severe enough to necessitate control, removal of the infected plant is the only satisfactory method.

The leaf-roller caterpillar is one of the few insect pests attacking the Chinese gooseberry and it can cause considerable damage to the fruit if spray applications are neglected. The caterpillars can be controlled by spraying vines with arsenate of lead (1oz. to 4 gallons of water) or D.D.T. (1½oz. of 25 per cent. wettable powder to 4 gallons of water). Spraying should be started near the end of December and continued at 3-weekly intervals until February if necessary.

Brown spot and grease spot are the two most common diseases which attack passion fruit. Brown spot (a fungous disease) is generally apparent in February and March; grease spot (a bacterial disease) is more noticeable in winter. Both diseases affect leaves, fruit, and laterals, and cause defoliation, shrivelling, and dropping of fruits, and ultimately the death of the vine. Pruning in spring followed by thorough application of Bordeaux mixture 3 : 4 : 50 (4oz. of bluestone, 5¼oz. of hydrated lime, 4 gallons of water) at monthly intervals throughout the year safeguards the vines and checks the spread of these diseases.

SEVERAL deaths and many narrow escapes from accidents have been associated with the carrying of passengers on tractors. This practice is most dangerous when an implement is being trailed, but it is not wise to carry a passenger on a tractor at any time. Although the driver may be quite safe on his seat, a passenger perched precariously somewhere else on the tractor can easily be thrown off when there is a bump or a sudden start or stop. The presence of somebody else on the tractor can also lead to conversation, which may distract the driver's attention sufficiently to cause an accident. This happened to a tractor driver and passenger recently, and but for the fact that part of a mounted implement held the tractor on the point of balance and allowed them to jump clear they would have been pinned under the tractor in a deep creek. Persons using tractors should always remember that a tractor can safely carry only one person, the driver.

—D. F. SCOTT, Machinery Instructor,
Department of Agriculture, Auckland

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Radio Broadcasts

Radio broadcasts to farmers will be given during April as follows:—

2ZA Palmerston North, 12.33 p.m.

4 April—"Hogget Management", by W. W. Hubbard, Livestock Instructor, Department of Agriculture, Palmerston North.

13 April—"Autumn-saved Pastures and Break Feeding", by B. A. J. Smith, Fields Instructor, Department of Agriculture, Palmerston North.

20 April—"Winter Stores for Bees", by L. H. Johnson, Apiary Instructor, Department of Agriculture, Palmerston North.

27 April—Y.F.C. session, by I. G. Tabor.

3YA Christchurch

6 April (12.20 p.m.)—"Lice and Ked Infested Sheep", by J. Gibson, Livestock Instructor, Department of Agriculture, Christchurch.

16 April (12.33 p.m.)—Review of "New Zealand Journal of Agriculture", by E. G. Smith, Fields Instructor, Department of Agriculture, Rangiora.

23 April (12.33 p.m.)—"Storage of Fruit and Vegetables", by M. G. Baumgart, Horticultural Instructor, Department of Agriculture, Christchurch.

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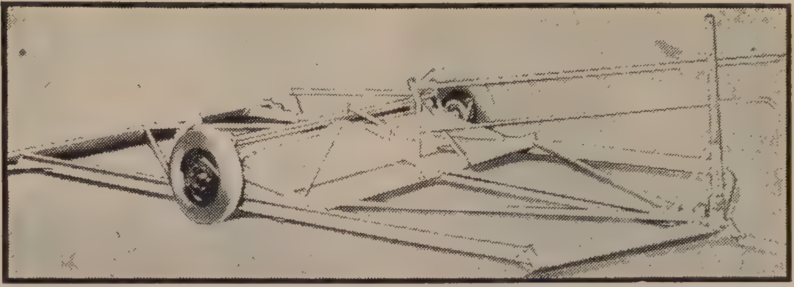
"Smooth Granulation in Honey"

In some copies of last month's "Journal" an error occurred in the article "Smooth Granulation in Honey". The temperature given in the caption to the upper illustration on page 117 should have read 57 degrees F., not 75 degrees F.

◆◆

The Modern Land Leveller Increases Production

MANY farmers are not getting the maximum production of which their farms are capable because modern farm implements cannot operate to full efficiency owing to unevenness of terrain. Considerable yield losses occur and farmers state that even with the most modern seed drills and harvesting machines losses are experienced year after year owing to uneven germination and uneven growing. Use of the land leveller, the implement described in this article by I. R. Falconer, Fields Instructor, Department of Agriculture, Ashburton, can do much to increase efficiency of operations and returns from crops.



Basically the modern land leveller is a steel frame.

A COMMON complaint of operators of header harvesters is that owing to uneven ground their machines frequently miss short plants. A grubber or cultivator only too commonly uses only half its capacity, half the tines being in the ground and half travelling in the air.

Reason for Loss

The underlying reason for this inefficiency is that improvement of the paddocks has not progressed apace with the advances made in farm implements, with the result that in many instances implements work on fields which are as they were 60 years ago. Farmers agree that most paddocks are too uneven to permit most effective use of horse-drawn, let alone tractor-drawn or self-propelled, implements. High dry and wet low spots, potholes, swampy areas, erosion, unsatisfactory drainage after rainfall, and a poor seed-bed, to mention only a few of the evils caused by uneven paddocks, cost New Zealand farmers thousands of pounds yearly.

Machines for Correcting Trouble

Land levellers have been invented for correcting this situation and making it possible to produce uniformly high yields on the entire acreage under cultivation. Land levelling means that the farmer can now cultivate and sow and harvest crops much more easily. Land levellers are inexpensive tools which operate with very low power requirements without the need of trained operators, and which will produce quickly, thoroughly, and or high spots, thus making it possible for all other farm implements such as the seed drill, cultivator, header, baler, automatically paddocks without low mower, or forage harvester to work at maximum efficiency.

Simple Construction

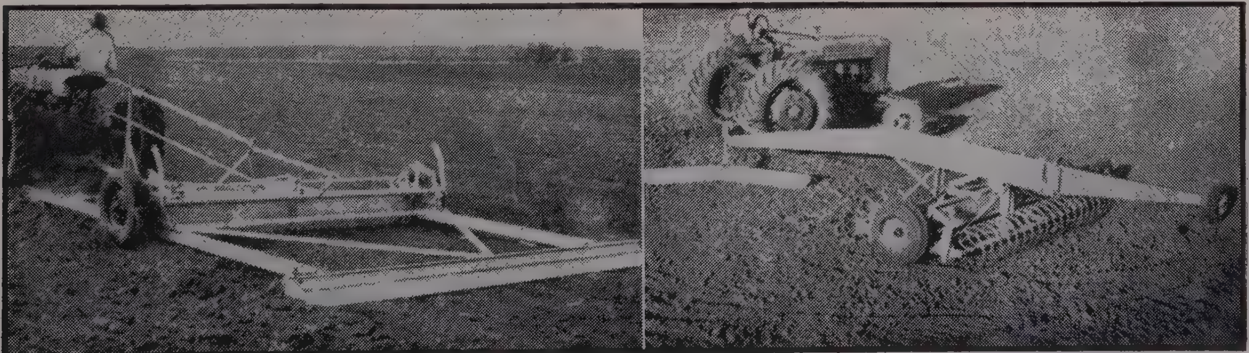
Basically a land leveller is a steel frame like the old and crude wooden float which is still used extensively in Central Otago irrigation areas.

The front end of the leveller, with the clod crusher, rides right down on the ground. The back end, with the rear smoother blade, also is right down on the ground to do the final smoothing and packing. Between the rear ends of the double-throw crank axles in the middle of the machine is suspended a blade which automatically levels off the high spots and fills the low ones. It is truly automatic, for on the other end of each crank axle and outside the frame is a wheel, one on each side of the leveller. At first glance the observer might think that these wheels carry the leveller, but except in soil moving and transporting they do not; they activate the blade. When the wheels go up on a high spot the blade on the other ends of the two crank axles has to go down, levelling off the high spots and carrying the soil along until the wheels, entirely automatically, feel out a low or soft spot. Then the wheels go down and the blade goes up, releasing enough soil pulverised and prepared from the load it carries to fill the low spot completely and firmly.

Thus land levellers by their simple construction and completely automatic action produce at minimum cost and greatest accuracy the kind of surface most suitable for efficient use of modern farm machinery. They also produce the most perfect seed-bed known to agriculturists, with the soil well aerated, evenly broken up, yet not pulverised by the gentle revolving action while it is carried before the scraper blade, and lightly yet firmly packed to permit good root development. Through the action of the rear blade the soil is left perfectly smooth and level for best moisture distribution.

Levelled Paddocks Pay

With all high and low spots levelled off, paddocks will dry out in minimum time, even after the heaviest rain. On irrigated land water will spread evenly without danger of erosion by too rapid run-off. In the spring or when the subsoil drainage is poor farmers can start working weeks earlier than is possible on unlevelled land because they do not have to contend with potholes or wet spots which make early cultivation impossible. When drilling is being done no troubles are encountered because of delayed germination or uneven growth, as the drill can be adjusted to the most efficient



Left—A leveller in operation pulled by a farm tractor. Right—A modern hydraulically operated leveller which is designed to turn in a small radius and which has a harrow attachment to leave a rough surface to prevent wind blowing of the soil.

depth, which can be maintained throughout the field without the danger of sowing too deeply in high spots or too shallowly in low ones. When cultivating is being done the full width of the cultivator can be used and there is no need to go over spots which the cultivator tines have not reached because of depressions in the ground. The same advantages exist for harvesting. Equipment can be run at top speed with the assurance that the header harvesters will reach even the shortest plants in the crop, avoiding the necessity of the whole paddock being hand picked later.

Crop yields and the efficiency of every piece of farm equipment are increased tremendously if fields are prepared with land levellers, and losses and strain of implements are reduced to a minimum.

Preparation for Irrigation

Recently a farmer in the Methven district on the Ashburton-Lyndhurst Irrigation Scheme demonstrated that it was possible to border dike land with a land leveller used with a small tractor fitted with a hydraulically operated grader blade.

An 18-acre paddock was first levelled. The leveller was drawn across the field in three directions. This initial levelling was done instead of one rolling and two harrowings. The field was now reasonably level, all finishes and high and low spots were levelled down to grade, and at the same time an almost perfect seed-bed was obtained.

A small 2-furrow tractor with grader blade was used, and in 10 hours' working the borders had been thrown up and the head ditch cut. Then in 11 hours with the use of a 3-furrow tractor the land leveller was drawn up and down the dikes to fill in the furrows made by the grader blade and to level out further between the dikes. When this work was completed the paddock was ready for sowing to permanent pasture on a perfectly worked seed-bed.

This farmer thus completed efficiently and cheaply with a modern land leveller work that will become in future normal farm practice on an irrigation farm.

Modern farm implements can work at their full efficiency on much arable land in New Zealand only if the fields have first been prepared and levelled.

Tile Drain Outlets

[*Sparrow Industrial Pictures Ltd. photos.*

THE outlet is an important part of any tile drainage system and too often a breakdown in an otherwise well-laid tile line is caused by the failure of the outlet to permit a free discharge of water. Sometimes an unprotected outlet pipe protruding into an open drain becomes undermined by the running water it discharges and drops out of alignment, allowing soil to fall into the end of the next tile and resulting in a blockage. Sometimes the tile outlet is too low and is covered by water for long periods in winter. (See inset photograph in heading illustration.) The outlet can be covered by floodwaters for a short period with no ill effect, provided there is a free and strong discharge when the water level recedes, but tiles soon become filled with silt if the outlet is submerged for long periods during winter.

Where outlets discharge into a ditch or stream the end tile should be fitted with a concrete collar and a small concrete apron below the tile on to which the outflows will discharge. If the bank is high, the drainage water is best carried into the stream by a flume fitted to the end of the discharge pipe.

Open drains used to take the flow from tile outlets should be at least 6in. deeper than the outlets or deeper if there is a danger of water lying in the drain and covering the outlet for long periods. All tile drain outlets should be held firmly in position, they should discharge above normal winter water levels, and erosion below the outlet should be prevented by a concrete collar and apron or, where necessary, a fluming.

Good, well-sited outlets mean much to the life of tile systems.

—*E. W. S. WILSON, Farm Drainage Officer,*
Department of Agriculture, Palmerston North

Book Review

"Morley's Dairy Farmers' Encyclopedia": Alan Morley

THIS book has obviously been written specifically for the British dairy farmer, and a great deal of the more useful information contained in it has little application to New Zealand dairying conditions. The style of writing is simple, easy, and direct, and the book is in consequence a very readable one. The title is misleading, for the book is not organised as an encyclopedia, but follows the conventional pattern of an elementary text in dairy husbandry.

In a comparatively slim volume Mr. Morley has attempted to cover a very wide field. He deals with the secretion and composition of milk, compares the relative merits of the dairy and dual-purpose breeds, and discusses the breeding and improvement of cattle and the problems involved in herd establishment. Included are sections on the properties of various feeding stuffs and on the reproduction, rearing, feeding, milking, and general management of dairy animals. Beef production is briefly covered. Health and disease receive rather superficial attention.

Some of Mr. Morley's recommendations will seem most peculiar to those accustomed to New Zealand's pastoral economy. An advocate of rotational grazing, he says: "The available grazing should be divided into as many fields as is practicable and each field in turn grazed heavily—say five or even ten cows to the acre—until the herbage is eaten down." Other recommendations may well be questioned by the scientifically minded. Farmers troubled with bulls leaving a high proportion of unwanted bobby calves are advised to introduce a new sire, which seems much akin to advising the losing gambler to try tossing a different penny.

Mr. Morley's book may prove useful to the British dairyman; it certainly cannot be recommended to the New Zealand farmer.

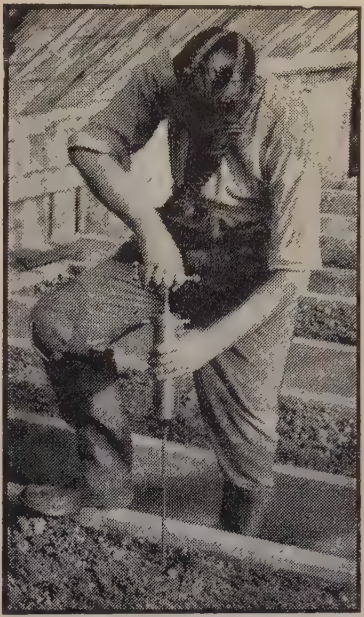
—*L.R.W.*

Elliot, Surrey. New Zealand price 7s. 6d.

Soil Sterilisation with Chloropicrin

By D. W. McCALLUM, Horticultural Instructor, Department of Agriculture, Blenheim

CROPS grown under glass are capable of providing excellent returns from relatively small areas because they can be produced out of season, when the commodity is scarce and prices are high, and also because of the high yields. In most instances, however, the same crop is grown in successive years and there may be a rapid build-up of disease unless means are taken to overcome such possibilities. This is especially so with tomatoes, with which the presence of soil-borne organisms can reach a degree where it is impossible to produce an economic crop. Rotational cropping is the answer to this problem in outdoor crops, because the range of plants which may be grown economically is relatively large. With glasshouse production of tomatoes the position is different, as there are few alternative crops which will return the costs of glasshouse production. Soil sterilisation in tomato glasshouses, which is now an accepted practice throughout New Zealand, permits the same kind of crop to be grown year after year with comparatively little trouble from soil-borne diseases and as a result yield is being maintained at a high level. Steam is undoubtedly the most efficient sterilising medium, but is expensive to apply. An alternative is chloropicrin, which has proved very effective, and this article describes its use under commercial conditions.

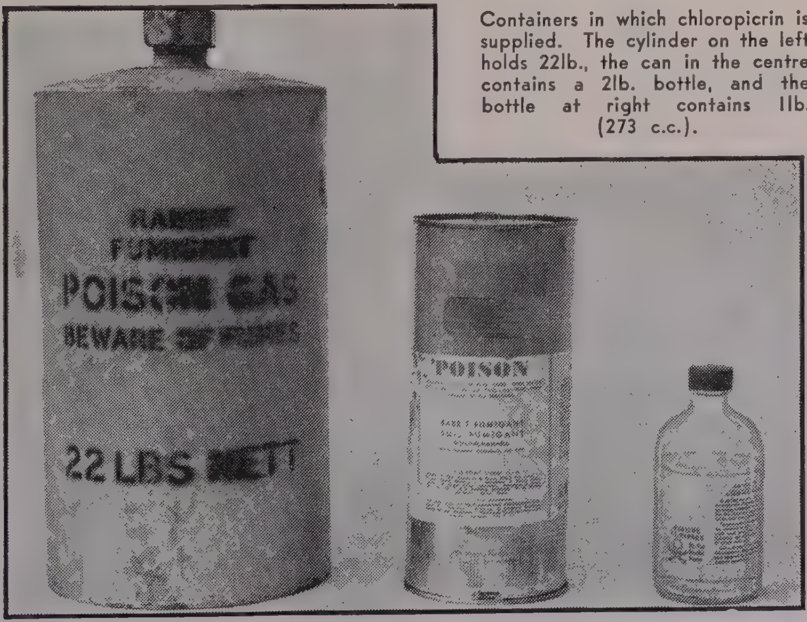


Treating beds in a troughed house. The marks along the side of the trough, 11in. apart, indicate the positions of injections. The respirator worn by the operator is of the type shown below, issued by the Army during the last war, and is suitable for the purpose.

CHLOROPICRIN is a heavy, volatile liquid and when injected into the soil vaporises and penetrates from 6 to 10in. in all directions. The amount of penetration varies with the soil type and with the condition of the soil at the time of application. Chloropicrin is toxic to insects, bacteria, and fungi and also to warm-blooded animals. For this reason adequate precautions must be taken when using it, as even small doses frequently inhaled can ultimately have deleterious effects, even though the effect of each exposure is comparatively slight. Its safety in use lies in the fact that no one could voluntarily remain in the intensely irritant vapour which it gives off. This vapour, in extremely small concentrations, will affect the eyes, causing them to water copiously, and on inhalation violent coughing will follow sometimes succeeded by vomiting. Depending on the amount inhaled the coughing fit may persist for an hour or so and the affected person usually develops a violent headache. Prolonged exposure to the gas will cause death. Apart from the fumes the liquid also has an irritant effect on the skin and any spilt on the hands or arms should be washed off immediately with clean water.

The foregoing remarks may seem to be a bad recommendation for the use of chloropicrin, but it is no more dangerous than many materials which are in constant use throughout the world. After all, the driver of a car or an electrician both handle articles which are potentially dangerous, but by observing various safety rules they are able to carry on without any danger to themselves or others. So it is with chloropicrin, and if the precautions mentioned later are observed, no person sterilising soil should suffer any inconvenience.

Chloropicrin is usually purchased by the pound and is delivered in glass bottles of 1 or 2lb. or in larger, steel cylinders of up to 22lb. (see illustration below). These should always be



Containers in which chloropicrin is supplied. The cylinder on the left holds 22lb., the can in the centre contains a 2lb. bottle, and the bottle at right contains 1lb. (273 c.c.).

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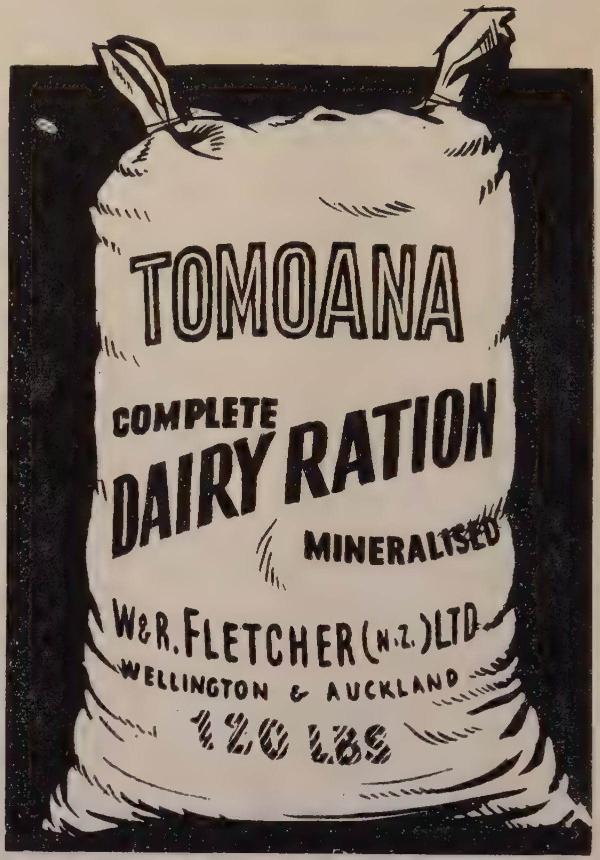

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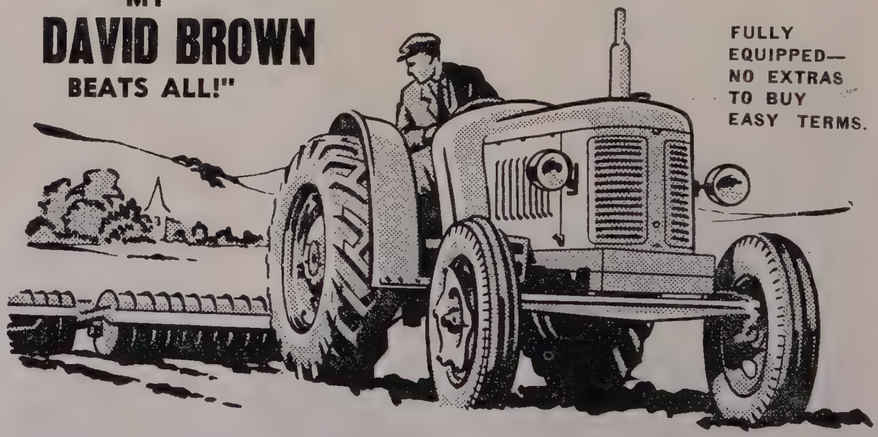

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opened outside and so that the wind blows fumes away from the operator. The dosage rate for soil injection is measured in cubic centimetres and is usually 3 c.c. to each square foot of soil. As 1lb. of chloropicrin is equivalent to 273 c.c., a 3 c.c. application per square foot will treat 91 sq. ft.

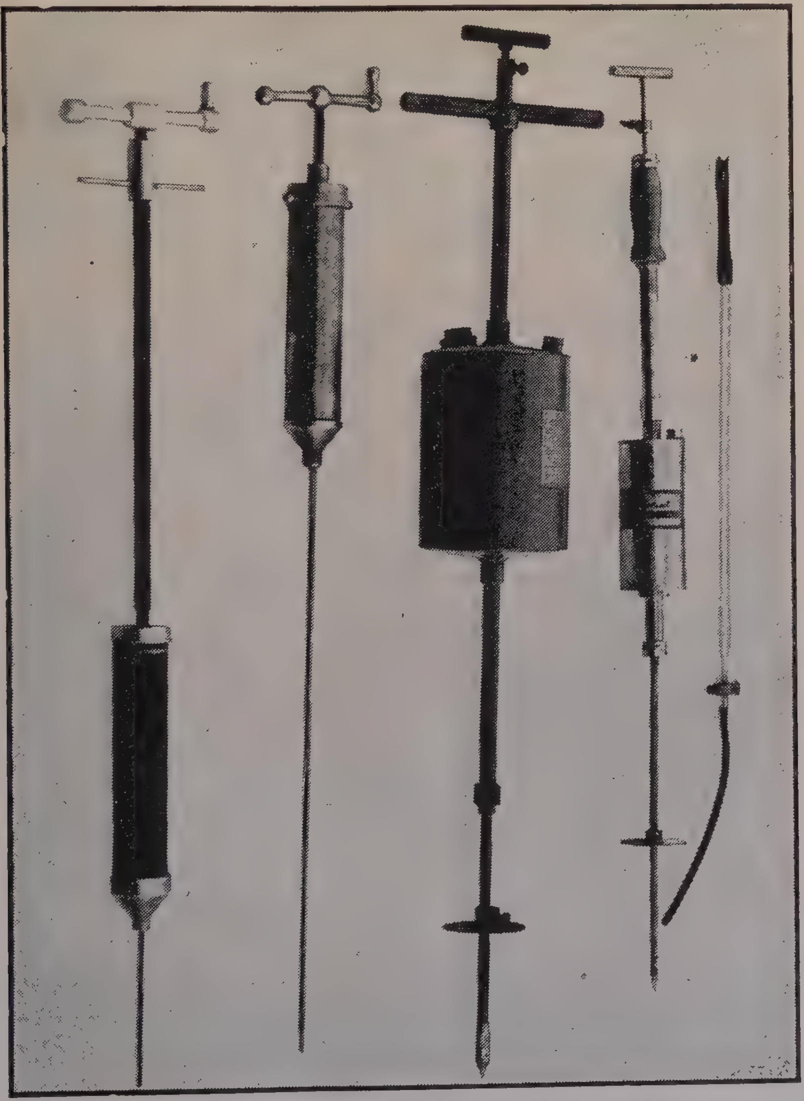
Method of Applying

Chloropicrin is most readily applied with a soil injector or, for small areas, a burette. Various examples of these are illustrated at the bottom of this page. The burette is used by holding it over a hole dibbled into soil, releasing the required amount of chemical (measured by a graduated scale marked on the burette), and then shutting off the small tap and moving to the next hole. The Jacks and the Shell injectors have a pump action releasing a predetermined quantity at each injection. The Shields injector has a screw which moves a piston down the barrel of the gun, and when the handle is given a half turn sufficient chloropicrin is released to give the equivalent of 3 c.c. per square foot.

As well as an injector an efficient and well-fitting respirator is required. The type issued by the Army during the last war, and illustrated on page 237, is satisfactory. The fit may be adjusted by the straps at the back of the headset and the respirator should be tested for leaks before being used by putting it on and pinching the tube tightly. If it is possible to breathe while the tube is pinched, the headset needs adjusting.

Watering before Sterilising

Before soil in a glasshouse is sterilised it should be worked to a friable condition free from lumps. Any compost or other form of organic matter such as stack bottom should already have been added. It is a good plan to give the house a thorough watering a couple of days before sterilising so that when the job is being done the soil is slightly moist.



Types of soil injectors. From left—A modified form of the Shields injector, the Shields injector, the Shell injector, the Jacks injector, and a burette.

One method of marking positions of injections is by tying tapes on a line every 11in. Note the chalk marks along the pipe at the back.

If the soil is inclined to be heavy or drainage indifferent, a longer period should be allowed between watering and sterilising. Most growers have developed their own system in marking out the glasshouse to show where to inject. A string with a knot every foot or 11in. (depending on the type of injector used) is commonly used and the distance between rows of injections is marked on the bottom plate on either side of the house with chalk or crayon.

Filling Injectors

The Jacks and Shell injectors are filled by removing a small nut at the top of the barrel and pouring the chloropicrin in either from 1lb. or 2lb. bottles. A pouring adaptor can also be supplied for the 22lb. cylinder, but it is recommended that this be used for filling a supply of 1lb. bottles rather than filling the injector direct from the cylinder. A supply of filled 1lb. bottles sufficient to sterilise the house, spaced evenly the length of the house will do much to speed the work. The caps should be kept on the bottles to save loss of chloropicrin and to reduce the concentration of fumes in the house.

The Shields injector is filled by inserting the nozzle of the gun into a container of chloropicrin and sucking the chemical up by withdrawing the piston in the barrel. To keep the chloropicrin away from the washers a

Filling the Jacks injector.

water seal is used. (Water floats on top of chloropicrin and the latter will not penetrate it.) Full instructions are given when this type of gun is purchased and should be followed carefully if good results are to be obtained.

Making Injections

With the glasshouse marked out and gun filled application of the chloropicrin may proceed. The upper illustrations on pages 237 and 239 show how this is done. As each injection is made the heel should be placed over the previous injection to assist in sealing the fumes in the soil. As each section (bay or trough) of the house is done a water seal is applied. For this the top ½in. of soil should be wet; this will seal the chloropicrin in the soil.

After a house is completed all vents should be shut, doors closed and locked, if possible, and the house left closed for at least 3 days. After this period the chloropicrin will have lost most of its unpleasant smell and effects, but it is still harmful and before much time is spent in the house it should be well ventilated. A day should suffice, less if the weather is warm and sunny, and the soil may then be forked over deeply. This cultivation will need to be done several times and after a fortnight all fumes should have disappeared. In heavy soils or in cold, damp weather a longer period may be required, but the presence or absence of fumes may be readily tested by setting a tomato plant out in the soil and if no burning of the foliage shows up in a day or two, the house may be considered safe to plant.

Points to Watch

Chloropicrin will give a result comparable with that from the use of steam, provided sterilisation is done carefully and thoroughly. The following points should be borne in mind:—

1. The best soil temperature is 65 degrees F. or higher; lower temperatures may give disappointing results.

2. No residue from last year's crop should be left on or in the soil. Fork the old plants out rather than pull them up.

3. Keep vents open when sterilising, closed after the job is finished, and open again during the cultivation period.

4. Inject from 6 to 8in. deep.

5. After sterilisation take every care not to reinfect the soil by bringing in disease from outside on boots and implements.

All photographs excepting the upper photograph on page 239 by Frank McGregor Photography.

Weed Control in Cereal Crops

By L. J. MATTHEWS, Weeds Research Officer, Department of Agriculture, Wellington

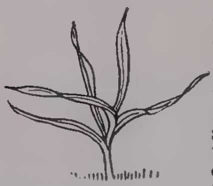
THE cereals wheat, barley, and oats may be successfully weeded with hormone preparations. Provided a suitable hormone preparation is used at the correct stage of growth, all weeds, with the exception of a few, are checked or killed without crop damage, those not killed being checked sufficiently to allow a clean harvest.

SUSCEPTIBLE weeds such as wild turnip, fat-hen, and black nightshade are destroyed completely, Californian thistle is either killed or checked severely, and more tolerant weeds such as docks, wireweed, lady's thumb, and black bindweed are checked sufficiently to facilitate harvesting.

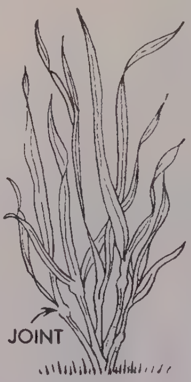
Growth Stage Important

The stage at which cereals are treated is important. Damage can occur even to wheat, the most tolerant cereal, if spraying is not carried out at the correct stage of growth. As with grasses, the cereals must have tillered before being sprayed. Once tillering has occurred hormone sprays can be applied until the early beginning of the boot stage, that is, when the upper sheath is beginning to swell with the enlarging head. Once the seed head has completely emerged further sprayings can be done while the seed is in the milk stage. After the milk stage excessive shattering may occur if hormones are applied.

As oats are less tolerant than wheat and barley, spraying should be restricted to a period between tillering and the jointing stage, the stage before the boot stage. If the predominant weed growth has struck from seeds, the spray application should be made as early as possible to catch the weeds at their most susceptible stage, namely, as seedlings. If, on the other hand, weeds such as Californian thistle and docks have arisen from root suckers, spray application should be made as late as the crop will permit to allow such weeds to attain their most susceptible stage of growth, namely, near the flower-head formation. If these recommendations are followed, usually one correctly timed application is sufficient to secure a clean crop.



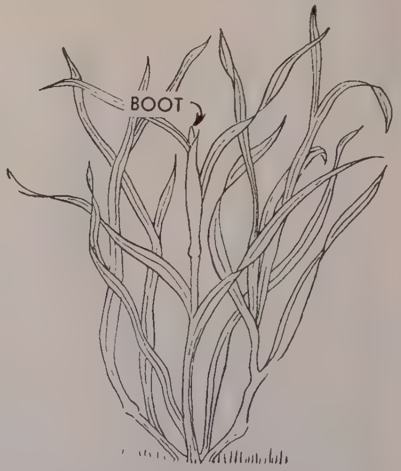
Tillered.



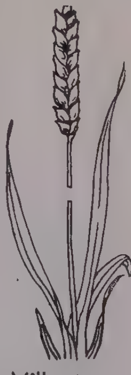
Jointing stage.

Hormone Preparations

Of the various hormones available, preparations based on the sodium salt of M.C.P. are most suitable, particularly for spring-sown cereals. Other preparations depress yields of spring-sown cereals, but are satisfactory for autumn- and winter-sown ones. Proprietary lines of the sodium salt of M.C.P. sold in New Zealand are "Tuloxone 30", "Agroxone 3", and "Phoxylene 30". These preparations all contain 3.0lb. of acid equivalent per gallon and should be applied at 0.5lb. to 1.0lb. of acid equivalent per acre for susceptible annuals such as wild turnip or at rates of 1 to 2lb. of acid equivalent per acre if tolerant weeds such as docks and black bindweed are dominant.

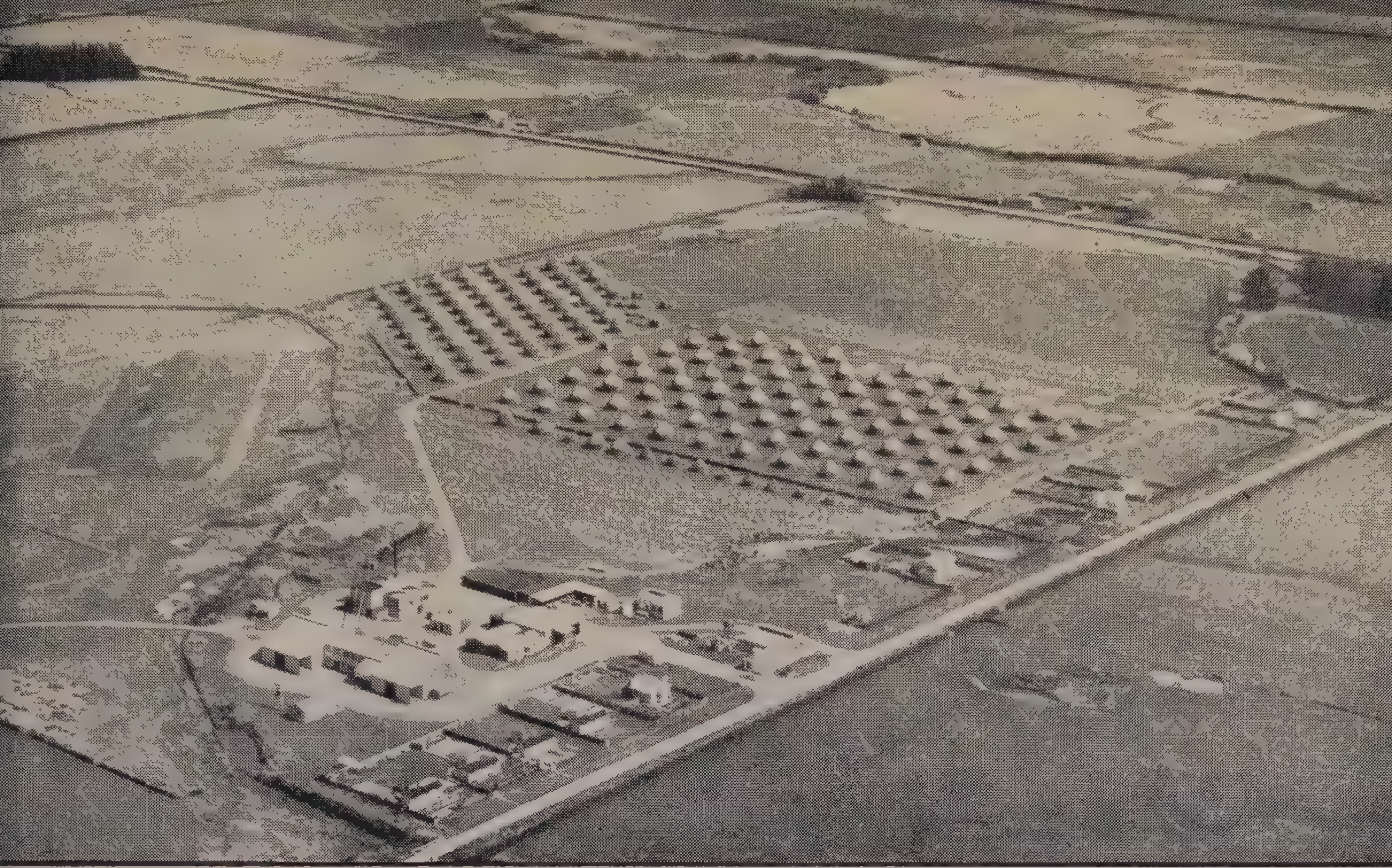


Boot stage.



Milk stage.

The tolerant weeds are checked by the present available formulations. New preparations now under trial show promise of severely damaging or destroying such weeds without being more toxic to the crop.



HEADING PHOTOGRAPH: Wartime linen flax factory at Methven. It is not now operating. Ministry of Works photo.

Linen Flax Trials in New Zealand

By P. B. LYNCH, Crop Experimentalist, Department of Agriculture, Wellington

LINEN flax is a new crop to New Zealand. Before the war commercial crops were unknown, but during the war, when an effort was made to find alternative sources of supply for England to replace those cut off by enemy action, over 20,000 acres were sown annually. Since then production has declined to a much lower, but, it is hoped, more stable level. With such a history it is no wonder that linen flax growing in New Zealand has been accompanied by many difficulties and has required a concentration of research work to solve the many problems arising. This article summarises the investigations into the finding of the most suitable soils, climate, variety, fertiliser, sowing method, rate of seeding, and harvesting method for the crop.

THE field work was conducted mainly by the Extension Division, Department of Agriculture, working in co-operation with the Agronomy (now Crop Research) Division, Department of Scientific and Industrial Research, and, more recently, with the Linen Flax Corporation of New Zealand, who have been responsible for preliminary trial work and the processing of the trial crops.

The changing acreage in linen flax in New Zealand is shown by the following figures recorded by the Linen Flax Corporation:—

TABLE 1—ACRES SOWN TO LINEN FLAX IN NEW ZEALAND

Year	Acres	Year	Acres
Before 1939-40	Nil	1945-46	4,447
1939-40	403	1946-47	4,095
1940-41	13,123	1947-48	4,537
1941-42	20,202	1948-49	4,692
1942-43	21,858	1949-50	2,875
1943-44	9,849	1950-51	174
1944-45	12,648	1951-52	1,882

The first field trials in New Zealand were a series of pilot plots sown in various districts, mainly in Canterbury and Southland in the 1937-38 season, so that investigational work had started a few years before the demand for information occurred. Up to the present the following numbers of field trials have been conducted by the Department of Agriculture:—

Simple pilot trials	168
Variety trials	46
Fertiliser trials	30
Method-of-sowing trials	18
Miscellaneous trials	13
Total	275

In addition to these experiments, several surveys of commercial crops have been made to examine the factors associated with fibre yields and quality. Linen flax is grown for its fibre, and the trade makes exacting demands as to its requirements in length of fibre and quality of fibre. Accurate evaluation of the crop is consequently more difficult than that of grain and seed crops.

Suitable Soils and Climate

Elliott (1) summarised pilot trials conducted in the 1937-38 season and reached the following conclusions:—

1. Liral Crown is a good all-round variety.

2. The best soil is a medium loam over a clay subsoil. Soils should not be too light, as the crop does not grow sufficiently well, nor too heavy, because of difficulties in preparing a satisfactory seed-bed. Crops on very rich soil are prone to lodging and grow coarse straw, and those on weedy land tend to be smothered, as the crop is a poor competitor with weeds. Moisture supply should be adequate but not excessive.

3. There are large areas of suitable land in Marlborough, Canterbury, South Otago, and Southland. Rust infection is too severe in North Island crops.

4. Yields of fibre and quality of fibre are generally satisfactory.

This series of pilot trials was continued with 32 trials in the South Island in the 1939-40 season and 33

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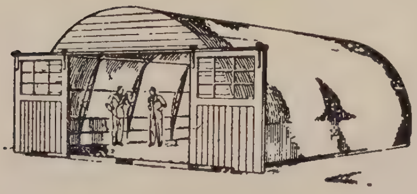

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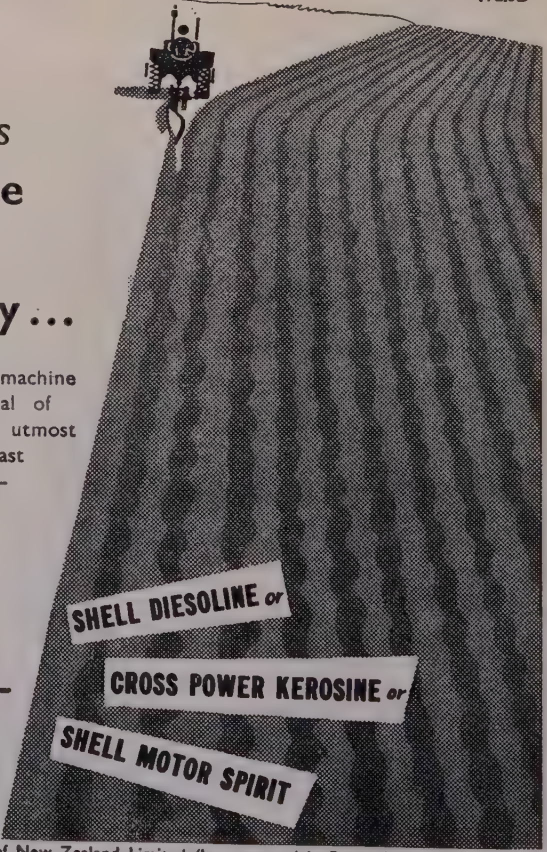

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field-scale trials in the North Island in 1940-41. Only 14 of the South Island and 7 of the North Island trials produced acceptable crops. The reasons for failures varied. All autumn-sown crops (2 in the South Island and 12 in the North Island) except one failed. In the South Island 14 crops were poorly grown, 2 were lodged, 1 was smothered by weeds, and 1 was too heavily rust infected. In the North Island 12 crops were poorly grown, 8 were too coarse, lodged, or weedy, and 4 were too heavily rust infected. From the information given it was not possible to correlate successful crops with previous crop, soil, or fertiliser. The series was generally disappointing, but confirmed the impression that most North Island districts were not suitable for linen flax and that autumn sowing was not satisfactory, owing to difficulties in crop establishment and severity of rust infection.

Survey of Extensive Commercial Crops

Elliott and Lynch (2) gave the results of a survey of the first extensive areas of commercial crops in 1940-41. These can be summarised briefly as follows:—

1. **Climate:** Adequate soil moisture is more important than temperature, especially in October, November, and December. Moist, humid weather near and at harvest is unfavourable, as it prevents satisfactory maturing of the crop and encourages the spread of disease.

2. **Soil** should be retentive of moisture, but not too heavy. It should be relatively free of weeds. The best soil is a medium loam with a stiff subsoil.

3. **Previous crop:** Best crops were obtained after grass.

Stafford (3), in surveying his experience with crops up to the time of writing (1944), stresses the importance of the personal factor in securing good crops. Good crops he defines as those having sufficient length of straw, even height, even stem diameter, straight, long roots, golden to milky-white straw colour, high fibre content, and freedom from weeds, disease, lodging, and damage. The best climatic conditions are those allowing early sowing and giving quick growth and early ripening. The soil should not be steep or stony. It should be clean, especially of Californian thistle, fat-hen, Scotch thistle, wild oats, wild turnips, yarrow, and cornbind. It should produce an even crop. The soil fertility must not be too high, and especially the soil must not have too high a content of available nitrogen. For this reason linen flax often does well on browntop country. Stafford would not express an opinion as to the best place in the rotation for linen flax.

[*"Evening Post" photo.*

Sample of good linen flax straw showing plenty of length and absence of branching.

Wright (4) gives a statistical study of field observations and factory returns for 616 crops in Canterbury and Southland for three seasons, 1945-46, 1946-47, and 1947-48. Variations significantly related to fibre production and quality were: Sowing date and growth period (as reflecting the stage of maturity at pulling), rust infection, and straw length. There were big differences between districts, the most favourable areas being South Canterbury and Southland. Crops with coarse straw showed the most lodging and rust infection, but had higher fibre percentage. A long growth period was associated with longer straw, a higher percentage of seed, and a greater weight of total crop per acre. On the other hand, late-sown crops had a higher percentage of fibre, and if these late-sown crops had good growing conditions, late sowing was no disadvantage. Linen flax should not follow a fed-off brassica crop, as this usually left the soil with too high a content of available nitrogen.

The information from pilot trials and surveys of commercial crops indicates that the following conditions govern successful linen flax growing in New Zealand:—

1. The soil must be retentive of moisture over the growing period.
2. The soil must not be too rich and especially must not have too high a content of available nitrogen.
3. The land must be relatively free of weeds. It is possible that this condition may not be so important with increasing use of hormone weed-killers, although linen flax is only moderately tolerant of these materials and unwise use of them can cause serious crop and fibre damage.
4. The climate must give reasonable spring rainfall, but not be humid at harvest. For the range of districts studied temperature during the growing period is less important than available soil moisture.
5. Crops after grass are satisfactory provided fertility is not too high. Browntop country can grow good linen flax. Fed-off brassica crops are unsuitable as prior crops.
6. Autumn sowing is generally less satisfactory than spring sowing. The danger of rust infection is much greater with autumn-sown crops and these assist the over-wintering of the rust fungus.
7. There are suitable districts for linen flax growing in Marlborough, Canterbury, and Southland, the most suitable areas being in South Canterbury and Southland.

Variety Trials

Since the 1939-40 season 46 variety trials with linen flax have been conducted and fibre yields are available from 31 of them. Most trials have been sown on replicated, drill-strip layouts, which give results capable of statistical analysis. The variety Liral Crown has been used as the standard variety in almost all trials and is still the standard commercial variety. It is used as the basis for comparison in the following summary and when well-grown produces a heavy crop of high-quality fibre. As with all varieties bearing the name Liral it is a product of the Linen Industries Research Association of Northern Ireland.

Liral Prince: Fibre yields are available from 25 trials. In length of straw Liral Prince was longer than Liral Crown in 10 out of 14 trials where measurements were made and equal in 4. Statistical analyses were possible on 19 of the 25 trials giving fibre yields, and 11 of these 19 showed Liral Prince giving significantly higher fibre yields than Liral Crown; in 6 trials the varieties did not differ significantly and in 2 trials Liral Prince yielded significantly less than Liral Crown. In one of these two trials where Liral Prince yielded significantly less than Liral Crown total straw yields did not differ, but Liral Prince sheaves were damaged by weather after pulling. In fibre quality Liral Prince was better than Liral Crown in 5 trials, equal in 11, and poorer in 8; no information is available from 8 trials. When superior to that of Liral Crown the fibre of Liral Prince was described as softer and finer.

Liral Prince is, therefore, generally longer in straw, gives higher fibre yields, and is equal in fibre quality to Liral Crown.

Concurrent: This is a Dutch variety that was grown extensively during the war. In 15 trials where measurements were made on straw length Concurrent was longer than Liral Crown in 5 trials, equal in 7, and shorter in 3. Statistical information on fibre yields

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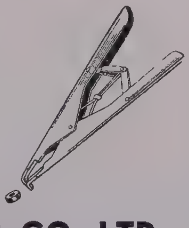

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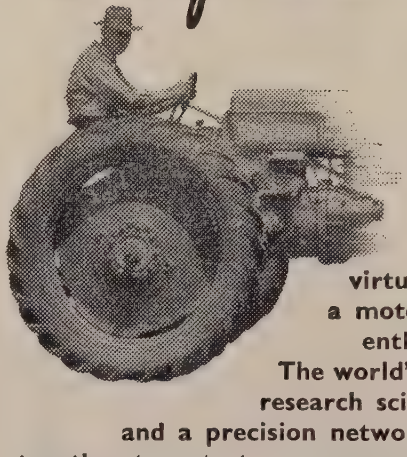

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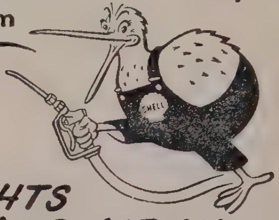

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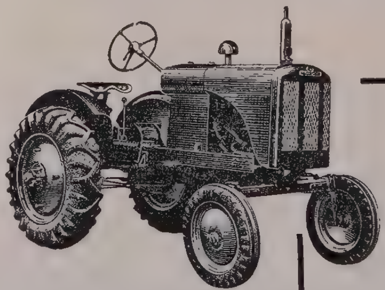

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is available from 17 trials, and of these Concurrent was significantly higher yielding than Liral Crown in 7, equal in 6, and significantly poorer in 4. In Southland no trial showed Concurrent poorer than Liral Crown, whereas 5 out of 7 trials where it was significantly better were located in that district. In fibre quality Concurrent was better than Liral Crown in 3 trials (all in Southland), equal in 8, and poorer in 4, with no information from 9 trials. In 2 trials it was noticeably more susceptible to lodging and it appeared susceptible to rust, but was not usually as badly infected as Liral Crown.

In all trials Concurrent has behaved similarly to Liral Crown. It has done particularly well in Southland and in that district is generally better than Liral Crown.

Giza Purple: In 6 trials, none of which can be analysed statistically, Giza Purple was shorter than Liral Crown in all cases. It gave poorer fibre yields in 4 trials and better yields in 1; no information was available from the remaining trial. In 3 trials where fibre quality was assessed it was poorer than Liral Crown. It seems an unsatisfactory variety for New Zealand conditions: it is too short, low yielding, and of inferior fibre quality.

A good crop of linen flax in stook in South Canterbury.

Stormont Cirrus: This variety was included in 19 trials. In 10 trials where straw length was measured it was longer than Liral Crown in 6 and shorter in 4. Most trials with Stormont Cirrus were conducted in the 1942-43 season. Unfortunately the seed used in that year was of poor germination and the results, which showed Stormont Cirrus significantly lower yielding than Liral Crown for fibre in 10 out of 12 trials, may have been affected by this factor. In 6 trials in other seasons no significant differences in yield occurred in 2 and in 4 Stormont Cirrus was better than Liral Crown, but with these 4 trials statistical analysis could not be done. Fibre quality was better than that of Liral Crown in 5 trials, equal in 4, and poorer in 3, and no information is available from 7 trials. Stormont Cirrus proved susceptible to rust and lodging.

TABLE 2—FIBRE YIELDS OF LINEN FLAX VARIETIES

Location of trial	Season	Soil type	Fibre yields (cwt. per acre)						Least significant difference 5 per cent.
			Yield of Liral Crown	Differences from Liral Crown					
				Liral Prince	Concurrent	R1	R2	R3	
Makikihi	1941-42	Rich clay loam	8.1	0.8*	—0.9*				0.3
Temuka	1941-42	Clay loam	4.6	—0.1	0.2				N.S.
Balcairn	1941-42	Medium clay loam	4.2	0.6*	0.5*				0.3
Riverlands	1942-43	Heavy loam	3.5	1.0*	0.4*				0.4
Lyalldale	1942-43	—	10.4	—1.1*	—2.6*				0.9
Gleniti	1942-43	Clay downs	9.9	—0.6	—3.0*				1.2
Ellesmere	1942-43	Heavy clay loam	6.5	0.5	1.6				N.S.
Koromiko	1942-43	Heavy loam	7.0	0.9*	—0.8*				0.5
Pleasant Pt.†	1944-45	Clay loam	6.8	—3.5*†					
Pleasant Pt.	1945-46	Clay loam	2.8		0.2				0.5
Claremont	1946-47	Claremont silt loam	11.9	1.3*					0.7
Geraldine	1949-50	Claremont silt loam	10.1			0.1		1.1*	0.9
Geraldine	1950-51	Claremont silt loam	5.3			0.5	—0.9	2.0*	1.0
Clydevale	1941-42	Clydevale light silt loam	7.1	—0.6	0.2				N.S.
Tapanui	1941-42	Shingly silt loam	11.6	0.3	1.3				N.S.
Croydon	1942-43	Medium silt loam	5.1	1.6*	0.8*				0.6
Winton	1942-43	Otapiri silt loam	6.1	2.2*					0.5
Dacre	1942-43	Medium loam	3.5	0.5	1.5*				0.7
Greenfield	1942-43	Clydevale light silt loam	4.4	1.1*	1.6*				0.6
Thornbury	1942-43	Medium loam	6.0	2.5*	1.2*				0.9
Tapanui	1942-43	Medium silt loam	6.7	1.7*	1.5*				0.7
Stony Creek	1942-43	—	3.3	0.5*	0.2				0.4
Northope	1949-50	Silt loam	8.6			—1.4*		Nil	0.5
Heddon Bush	1950-51	Silt loam	3.2			1.4*	0.3	0.9*	0.6

* Differences statistically significant.
† Fibre yields of Liral Prince reduced by weathering of sheaves.
N.S. No statistically significant difference.

The yielding ability of Stormont Cirrus has not been accurately determined, but it would seem to be at least as good as Liral Crown in this respect and in fibre quality and straw length.

Other varieties: Four trials with Stormont Gossamer showed it significantly poorer in fibre yields than Liral Crown in 2 trials and equal in 2. One trial showed it was poorer in fibre quality and it proved susceptible to rust. Norfolk Earl was equal to Liral Crown in one trial and significantly poorer in another.

In recent years stress has been placed on the importance of rust resistance in linen flax varieties and certain varieties of Russian origin have shown considerable promise in this respect. These have been included in 4 trials and have proved to be resistant, if not immune, to most of the strains of rust fungus in New Zealand. They are longer in the straw than Liral Crown, but are more susceptible to lodging. One, identified by the Crop Research Division as R3, gave significantly better fibre yields than Liral Crown in 3 trials and was equal in 1. It was the most resistant to lodging of the Russian varieties, although more susceptible than Liral Crown. It is a distinctly promising variety and experimental work is being continued with this and the other varieties of similar origin.

Table 2 summarises the results of trials on which statistical information is available with the varieties Liral Crown, Liral Prince, Concurrent, and the Russian varieties R1, R2, and R3. Stormont Cirrus is not included because of the probable effect of poor seed germination in the majority of trials with this variety.

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Fertiliser Trials

Twenty-six fertiliser trials have been conducted and yields are available from 13. The trials were of various types and it is probably more convenient to examine the effects of the fertilisers included in them individually than to study the trials themselves.

Phosphatic fertilisers: In 10 trials where superphosphate was drilled with the seed at rates of 1 to 3cwt. per acre no significant difference from "no treatment" was recorded in 6 experiments, in 3 trials statistical analysis was not possible, and in the remaining trial superphosphate significantly depressed fibre yields. Where superphosphate depressed yields, and also significantly depressed germination, it was applied at 302lb. per acre. Five trials comparing superphosphate and reverted superphosphate and a trial with serpentine superphosphate showed no significant difference in fibre or crop yields among these fertilisers. In 3 trials with rates of from 1 to 2½cwt. of superphosphate and reverted superphosphate no significant differences occurred.

From the evidence available phosphatic fertilisers are not required for linen flax grown under the conditions of the trials (see Table 3).

Potassic fertilisers: In 5 measurement and 5 observational trials no responses to potash fertilisers were recorded. Potash was applied as sulphate or muriate of potash at 1cwt. per acre in the measurement trials, and was topdressed on top of the drills after sowing, as this fertiliser may cause severe germination injury. The 5 observational trials were sown in Otago and Southland and in these trials 2cwt. of 30 per cent. potash salts was topdressed after sowing.

Lime was included in 2 trials and caused depressions in fibre yields in both. In the trial where statistical analysis was possible the depression was significant.

Nitrogenous fertilisers were included in 2 trials; one showed a significant depression in fibre yields to 1cwt. of sulphate of ammonia topdressed after drilling and the other showed no significant difference. Crop surveys support the belief that an over-supply of available nitrogen results in depressed fibre yields and causes difficulties with lodging and coarse straw.

Minor elements: Boron, applied as borax topdressed after drilling at 15 and 25lb. per acre, significantly depressed fibre yields in 2 trials, had no effect in one, and in another at Geraldine gave a significant response. A small depression was recorded in a trial not statistically analysed, and in a second trial borax had no effect.

Molybdenum and manganese were each sown in 2 trials, but had no significant effect on fibre yields.

No clear-cut case for the use of fertilisers with linen flax has been established by these experiments. In some trials fertilisers had a visible and a measurable effect on crop growth, but a depressing effect on the percentage of fibre in the straw. Much more work would be required to establish reasons for the results obtained and to investigate the manurial requirements of linen flax sufficiently to give wholly reliable data, but the interim conclusion must be that fertilisers are not required for linen flax production in New Zealand in many circumstances. It is possible that linen flax grown after poor browntop turf may respond to phosphates and nitrogen. Table 3 summarises some of the results from trials with fertilisers on linen flax.

Above—Lodged and tangled crop of linen flax impossible to harvest for fibre. Below—Clean, well-standing crop ready for harvesting.

TABLE 3—EFFECT OF FERTILISERS ON LINEN FLAX

Location of trial	Season	Soil type	Previous crop	Fibre yields in cwt. per acre.									
				No fertiliser	Differences from no fertiliser								Least significant difference 5 per cent.
					Super. 1cwt.	Super. 2cwt.	Rev. super. 1cwt.	Rev. super. 2cwt.	Potash 1cwt.	Borax	Lime 1 ton		
Methven	1942-43	Clay loam	Wheat	36.3*	1.3	1.5	—0.3					1.8
Ohoka	1941-42	Medium clay loam	Wheat	3.5	—0.3				—0.4	Nil		N.A.
Springbank	1941-42	Medium clay loam	Grass	4.0	1.1					—0.3		N.A.
Oxford	1941-42	Medium clay loam	Grass	10.7	—0.7							N.A.
Pleasant Pt.	1944-45	Clay loam downs	Rape for seed	4.6					—0.2	—0.6†		0.3
Pleasant Pt.	1944-45	Clay loam downs	Rape for seed	40.0‡	1.0		1.0					N.S.
Pleasant Pt.§	1945-46	Clay loam	Wheat	3.7		—0.5†			—0.3†	—0.7†	—0.6†	0.3
Claremont	1946-47	Claremont silt loam	Grass	72.0*		—6.0	—2.0		Nil			N.S.
Highbank	1947-48	Methven silt loam	Grass	2.9	0.3	0.4	0.4	Nil				N.S.
Hilton	1947-48	Opuha silt loam	Grass	2.8		—0.1	0.3	0.1				N.S.
Geraldine	1949-50	Claremont silt loam	Barley	8.8						0.9†		0.6
Clydevale	1941-42	Clydevale light silt loam	Grass	4.8	0.2	0.2			0.3			N.S.
Winton	1941-42	Otapiri silt loam	Swedes	10.2							—0.9	N.A.
South Hillend	1949-50	Silt loam	Grass	10.1						0.1		N.S.

N.A. No statistical analysis possible.
N.S. No significant difference among treatments.
* Total crop yields; fibre yields not available.

† Difference statistically significant.
‡ Deseeded straw yields; fibre yields not available.
§ In this trial superphosphate was applied at 302lb. per acre.

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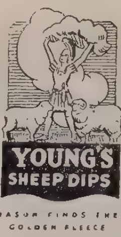
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2.2C

Linen flax in stacks at factory awaiting processing.

Sowing Method and Seeding Rate

Linen flax has been one of the few crops with which sowing with the subsurface-broadcast coulter has given advantages over ordinary drilling in 7in. drills. Elliott and Gidall (5) describe a trial with Liral Crown linen flax sown at four different seeding rates with subsurface-broadcast and ordinary coulters. At high seeding rates the broadcast coulter gave better straw and fibre yields, a more even distribution of plants, straw more even in diameter, and a crop more free from weeds. Hadfield (6) gives details of trials conducted in 1944-45 and 1945-46 which showed the broadcast coulter giving greater fibre yields and more even straw than the ordinary coulter.

From 7 trials from which measurements are available the broadcast coulter gave significantly better fibre yields than the ordinary coulter in 4 trials and no significant difference in another; in 2 trials, where total crop yields only were obtained, there was no significant difference between yields from crops sown with the two types of coulters. In 3 observational trials no differences could be seen in 2 and in the third the crop grew higher on the broadcast-coulter plots.

Rate of Seeding

In many experiments seeding-rate comparisons were made with type-of-coulter comparisons and, as Elliott and Gidall indicate, the subsurface-broadcast coulter gives relatively better yields at the high seeding rates, because the seed is better spread. Whatever the method of drilling it is clear that seeding rate has an important effect on fibre yields. Table 4 summarises some of the results that have been obtained in trials.

Seeding rates up to at least 115lb. per acre appear to be worth while according to the above trials, and the broadcast coulter may be able to give increased yields at rates above 115lb.

Miscellaneous Trials

Method of harvesting: Two trials compared the puller with the reaper and binder as machines for harvesting linen flax. The puller removes the roots with the stem, thus enabling a greater length of straw to be harvested than is obtained with the binder. Both trials were at Pleasant Point. In the 1944-45 season there was no significant difference in fibre yield in crops harvested by different methods, although the straw length was reduced by the binder from 30in. to 25in. and the fibre length from 23in. to 20in. The binder sheaves were better butted and easier to handle.

The trial in 1945-46, however, gave much better fibre yields from the plots harvested with the puller. The straw length was reduced by the binder from 26in. to 20in. and much of the binder-cut straw was too short for processing.

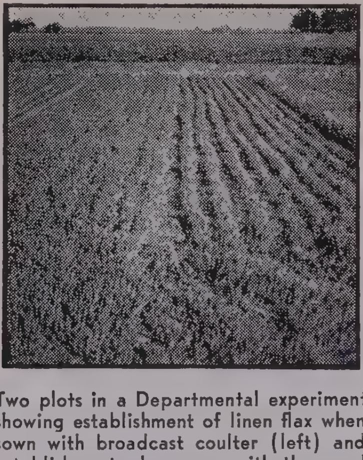
It appears that the puller is especially valuable for crops which are just long enough to be acceptable for processing. A considerable proportion of crops are in this category.

Size of sheaves: Sheaves of different sizes were made in the 1944-45 and 1945-46 seasons. In the 1945-46 season there was no visible difference in condition among sheaves of 21in., 23in., and 26in. in circumference. Harvesting weather was good. Under adverse conditions in 1944-45, however, large

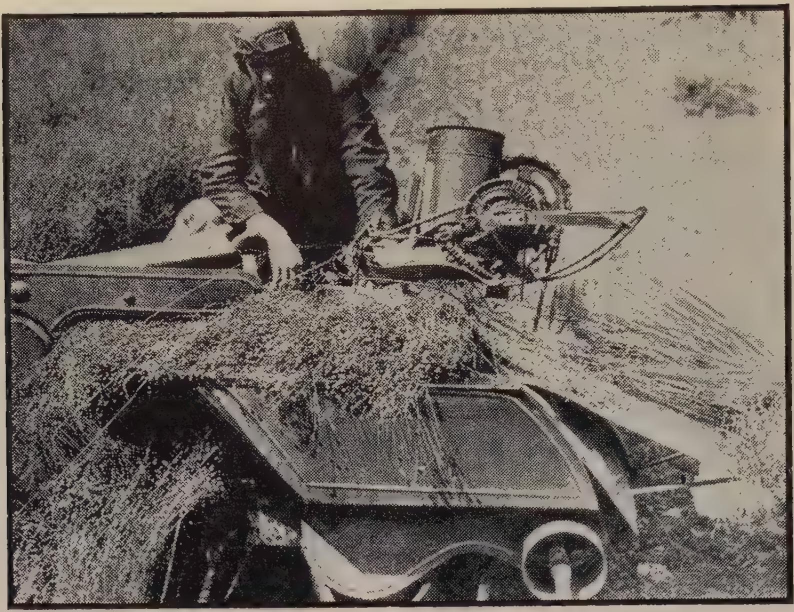
TABLE 4—EFFECT OF SEEDING RATE ON FIBRE YIELDS

Location of trial	Season	Soil type	Type of coulter	Fibre yields in cwt. per acre				
				Seeding rate per acre				Least significant difference 5 per cent.
				Very low (60lb.)	Low (90lb.)	Medium (115lb.)	High (125lb.)	
Highbank	1947-48	Methven silt loam	Broadcast		3.2*		3.6†	0.3
Hilton	1947-48	Opuha silt loam	Broadcast		2.9		2.9	N.S.
Pleasant Point	1944-45	Clay loam	Broadcast	4.0	4.7	6.0	6.2	0.5
			Ordinary	3.8	4.8	5.5	5.1	
Pleasant Point	1945-46	Clay loam	Broadcast	2.7	2.9	3.3	3.7	0.2
			Ordinary	2.2	2.7	2.7	2.7	
Centre Bush	1946-47	Silt loam	Broadcast		12.3		13.3	2.3
			Ordinary		9.0		10.6	

* 108lb. of seed per acre. † 158lb. of seed per acre.



Two plots in a Departmental experiment showing establishment of linen flax when sown with broadcast coulter (left) and establishment when sown with the usual coulter drill at 7in. spacings (right).



[*National Publicity Studios photo.*

Puller machine used for harvesting linen flax. With this machine a greater length of straw can be harvested than can be obtained when the binder is used.

sheaves were mildewed and rotted in the centre, but the small sheaves were in good condition and gave better yields of fibre for the same weight of straw.

Summary

An extensive experimental programme and a series of crop surveys have been undertaken on the linen flax crop since the 1937-38 season. The information from this work may be briefly summarised as follows:—

1. Soils suitable for linen flax are retentive of moisture, of not too-high fertility, and relatively weed free. The crop can be grown successfully in many areas of Marlborough, Canterbury, and Otago-Southland; South Canterbury and Southland are particularly suitable.
2. Linen flax can follow most crops in a rotation, though fed-off brassica crops appear unsuitable as prior crops. The crop should be spring sown.
3. Liral Crown, Liral Prince, and Concurrent are suitable varieties, but are liable to rust. Some Russian varieties now under trial appear promising in agronomic characters and are rust resistant.
4. There is no evidence that fertiliser applications will give increased fibre yields.
5. The subsurface-broadcast coulter appears particularly valuable for linen flax.
6. High seeding rates generally give better fibre yields, particularly with the subsurface-broadcast coulter.
7. The puller harvesting machine is probably more satisfactory than the reaper and binder, particularly on crops just long enough for processing.

Acknowledgments

Without the co-operation of the numerous farmers on whose properties field trials have been conducted, experimental work could not have been undertaken. The assistance of many officers of the Department of Scientific and Industrial Research and the Linen Flax Corporation of New Zealand have made the investigations possible. They have been responsible for the processing of the crop after harvest and the securing of seed supplies for the variety trials.

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Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during April as follows:—

1YA Auckland, 7.15 p.m.

1 April—"Internal Parasites of Stock", by G. V. Wallace, Veterinarian, Department of Agriculture, Auckland.

8 April—"Drainage on the Hauraki Plains and Similar Land", by G. L. Banfield, Instructor in Agriculture, Department of Agriculture, Thames.

15 April—"Winter Pasture Management", by J. R. Adams, Instructor in Agriculture, Department of Agriculture, Pukekohe.

22 April——"Herbaceous Perennials in the Home Garden", by M. J. Lockie, Horticultural Instructor, Department of Agriculture, Auckland.

29 April—Y.F.C. session, by the Dominion president of New Zealand Federation of Young Farmers' Clubs.

1XH Hamilton, 12.33 p.m.

2 April—"Wintering the Dairy Herd", by D. W. Caldwell, Veterinarian, Department of Agriculture, Hamilton.

9 April—"Farm Shelter", by H. M. Bull, Instructor in Agriculture, Department of Agriculture, Hamilton.

16 April—"Meat and Wool Outlook for 1953", by A. B. Baker, Federated Farmers, Hamilton.

23 April—"Hygienic Production of Milk", by A. T. Gabolinscy, Special Inspector, Department of Agriculture, Hamilton.

30 April—"The Feeding of Household Poultry", by W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton.

1YZ Rotorua, 7.15 p.m.

2 April—"The Beekeeper and His Work", by R. Goddard, Apiary Instructor, Department of Agriculture, Tauranga.

16 April—"Ewe Management in Winter", by D. W. Caldwell, Veterinarian, Department of Agriculture, Hamilton.

30 April—"Pasture Management in Autumn and Winter", by N. A. Clarke, Instructor in Agriculture, Department of Agriculture, Matamata.

Regular Sessions

1XH Hamilton, Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (Report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (Waikato stock review).

1XN Whangarei, Mondays at 8 p.m., Wednesdays at 8 p.m. (Northland stock market report), Fridays at 8 p.m.

1YA Auckland, Mondays at 7 p.m. (Auckland stock market report), Tuesdays at 12.35 p.m., Wednesdays at 7 p.m., Thursdays at 12.33 p.m.

1YD Auckland, Thursdays at 7.30 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock review), fortnightly on Tuesdays at 12.33 p.m. (Federated Farmers' session), Tuesdays at 6.55 p.m. (Frankton stock market report), Thursdays at 12.33 p.m., Thursdays at 7.15 p.m. (farm talks alternating with session for Bay of Plenty farmers), fortnightly on Fridays at 12.33 p.m. (pig council talk).

2XA Wanganui, Wesdnesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m.

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8 p.m. (stock review).

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.33 p.m. (Hawkes Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawkes Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Tuesdays at 8 p.m., Thursdays at 8 p.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m.

3YZ Greymouth, Thursdays at 12.33 p.m.

4YA Dunedin, Wednesdays at 7.20 p.m., Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., and 7.15 p.m., Tuesdays at 7.15 p.m (Lorneville stock market report), Thursdays at 12.33 p.m.

Trial of Pre-cooling and Rail Transport of Celery

CELERY has become an increasingly popular salad vegetable, but its popularity depends on its condition when it reaches the consumer. Unless the correct treatment is given while the crop is growing and during its transport to market, the article received by the consumer can be very inferior. Also celery rapidly loses its crispness, and one of the principal problems faced by the grower distant from city markets is the transport of his product in satisfactory condition. In this article by A. A. Powell, Storage Specialist, Department of Agriculture, Wellington, a brief account is given of a successful transport trial recently carried out with pre-cooled celery.

EXPERIENCE has shown that the carriage of perishable goods is much improved by pre-cooling before transportation. At Birdwood Gardens, Levin, modern refrigeration plant and equipment for cooling an insulated room 18ft. by 16ft. by 11ft. high, operating on automatic temperature control, were recently installed.

To observe the effect of pre-cooling on long-distance transport of celery a trial was carried out in March 1952 with the co-operation of Mr. R. P. Sisson, of Birdwood Gardens, and the New Zealand Railways.

Transport Arrangements

The trial provided for the pre-cooling of 600 cartons of celery and for rail transport in an insulated W.A. wagon by ordinary goods freight. Temperatures were checked with 4 capillary tube thermometers. Transport by express goods would have been an advantage because of shorter time taken on the trip, but was not possible, as the quantity of celery was insufficient to justify the use of the large V.B. bogie wagon necessary for express transport.

Recording thermographs would have been preferable to the capillary tubes, but the recording mechanism would be upset by the jolting of the wagon during shunting operations at various stations.

Celery Used in Trial

Celery is produced under expert management at Birdwood Gardens with the use of modern equipment, including an overhead irrigation system and a dusting machine capable of treating 50,000 plants per hour.

Harvesting is done 11 to 12 weeks after planting in the field, and successive plantings spread the maturity of the crops from January to the end end of July.

The celery for the trial was harvested on 12 March and after being graded was packed in ventilated cardboard cartons 24in. by 10in. by 5in. These were placed in the pre-cooling room, which is maintained at a temperature of 33 degrees to 35 degrees F. and a relative humidity of 95 per cent.

Attractively packed celery of excellent quality.

On 17 March the 600 cartons were transported from Birdwood Gardens by motor-truck under cover of a tarpaulin and loaded at 3 p.m. into the W.A. wagon at Levin Station.

The wagon temperature at the time of loading was 66 degrees F. The 600 cartons only half filled the wagon and better temperature control would have been attained if the wagon had been filled nearer to capacity.

Arrangement of Thermometers

The dials of 4 capillary tube thermometers were mounted outside at one end of the wagon and the tubes taken in through the door seal and placed as follows:—

No. 1: In a carton of celery in the centre of a stack near one end of the wagon.

No. 2: Suspended in the centre of the wagon about 12in. below the ceiling.

No. 3: As for No. 1, but at the opposite end of the wagon.

No. 4: As for Nos. 1 and 3, but in the centre of the wagon.

The table on this page sets out the temperatures recorded.

The readings of No. 4 thermometer at 4 p.m. and 6 p.m. on the day of loading would indicate that by some mischance this particular carton had been loaded without being pre-cooled.

Despite the length of time on the journey the celery arrived at Auckland in excellent, fresh, crisp condition and was favourably reported on by buyers.

The trial demonstrated that pre-cooled celery could be transported from Levin to Auckland and arrive in excellent condition after being in a wagon for 40¾ hours.

TEMPERATURES RECORDED IN RAILWAY WAGON

Thermometer number	Opening temperature of wagon at Levin at 2.45 p.m. on 17/3/52	At Levin siding after loading on 17/3/52		On arrival at Auckland at 7.45 a.m. on 19/3/52, 40¾ hours after loading at Levin
		4 p.m.	6 p.m.	
	Degrees F.	Degrees F.	Degrees F.	Degrees F.
1	66	43	41	50.5
2		65	60	56.5
3		45	41	50.5
4		62	61	55.0

[*Neville Studio photo.*

Cartons of celery stacked on the racks of the cool chamber.

Care of Livestock during April

Contributed by the Animal Research Division

DRYING OFF DAIRY COWS

A DAIRY cow requires a reasonable spell between lactations, and should be dried off at least 6 weeks before she is due to calve. This should be done even if she is still milking heavily. The drying-off process need not be prolonged: it is quite safe just to stop milking, provided any quarters affected with mastitis are treated with the usual course of 3 tubes of penicillin, the last tube being given after the cow is milked for the last time.

DECEMBER-FARROWED PIGS

Litters farrowed in December should be sold as pork. If they are carried on to bacon weights, no milk will be available for the later litters, which will have to be sold cheaply as stores or wintered on expensive concentrates. Available root crops may be fed to sows, but they require supplementing with milk or meat meal.

TUBERCULOSIS IN POULTRY

Tuberculosis not only causes considerable loss in poultry, but it frequently spreads to pigs, with consequent condemnations at the meat works. If this disease is suspected, veterinary aid should be sought with a view to eliminating affected birds.

CARE OF EWES

If rams remain with the ewes for more than 4 weeks, they should be raddled on the brisket so that the late-lambing ewes can be drafted off. Once the ewes are in lamb the level of feeding should be lowered to prevent their becoming too fat. If the rate of stocking is increased during autumn, some paddocks can be shut up and pasture allowed to grow for grazing during the 3 weeks before lambing. These measures will greatly assist in reducing "sleepy sickness", which is most prevalent in fat ewes which are inadequately fed just before lambing. Ewes which are well fed during the month before lambing produce on the average half a pound more wool per head than those which are underfed during this period.

CARE OF LAMBS

If the summer and autumn have been wet, lambs are likely to be suffering from worms. Drenching with phenothiazine 2 or 3 times at 3-weekly intervals will help. This applies particularly to the tail of the flock, which should be drafted off for special attention. Feed, however, is the most important consideration. During autumn lambs do best if grazed on pastures which have been allowed to grow to a height of about 6in. Hay aftermath and red clover are both very good. If these are not available, the lambs should be distributed thinly over the dairy paddocks or on hill pastures. They should on no account be concentrated in large numbers on short, rapidly growing pastures, especially if these have previously been grazed by ewes and lambs.

PURCHASE OF HERD SIRE

If a new herd sire will be required this year, now is the time to make inquiries. The New Zealand Dairy Board issues a Sire Survey and Merit Register which gives the production of the daughters of all dairy sires which have been surveyed. Unfortunately very few progeny-tested sires are available, but the Register should be consulted and wherever possible a bull by a proven sire out of a merit cow should be selected. Bull catalogues are issued annually by the Herd Improvement Association and these, too, should prove of considerable value to dairy farmers who are looking for herd sires. The New Zealand Dairy Board is now developing artificial insemination on a commercial basis and farmers interested in making use of this service should get in touch with their local Herd Improvement Association.

CARE OF CALVES

The best way to prevent calves dying during winter is to treat them properly during autumn. They should never spend more than 2 or 3 days in one paddock, and should be rotated ahead of the cows through the best paddocks available. Good-quality hay should be provided for them daily, especially when the feed is growing fast after autumn rains. At the first sign of scouring they should be drenched with phenothiazine.

AUTUMN-SAVED PASTURE

Early-calving cows are nearly always short of feed during July and August, and often during September. In most seasons pasture is not growing fast enough during these months to meet the requirements of milking cows. Crops are expensive to grow and concentrates are even more expensive to buy. It costs nothing, however, to shut up pasture in the middle of April and let it grow for use in early spring. About a sixth of the dairy area should be shut up in this way. Advice regarding the best paddocks to spell and the best method of feeding the autumn-saved pasture by the use of electric fences can be obtained from local officers of the Department of Agriculture.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during January and for the 6 months ended 31 January 1953, with comparative figures for the same month and 6-monthly period of 1951-52, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

		Tons		Percentage
Period	Creamery	Whey	Total	inc. or dec.
January 1953	21,205	415	21,620	—
January 1952	21,888	353	22,241	—
Increase or decrease ..	—683	+62	—621	—2.792
6 months ended 31/1/53	116,128	2,081	118,209	—
6 months ended 31/1/52	111,619	1,815	113,434	—
Increase or decrease ..	+4,509	+266	+4,775	+4.209

Butter in store at 31 January 1953 was 21,539 tons

CHEESE

		Tons		Percentage
Period	White	Coloured	Total	inc. or dec.
January 1953	13,537	15	13,552	—
January 1952	12,939	203	13,142	—
Increase or decrease ..	+598	—188	+410	+3.119
6 months ended 31/1/53	65,941	79	66,020	—
6 months ended 31/1/52	59,501	519	60,020	—
Increase or decrease ..	+6,440	—440	+6,000	+9.996

Cheese in store at 31 January 1953 was 17,457 tons

If these figures are converted into butterfat equivalent, there is an increase of 5.321 per cent. in butterfat graded for the 6 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Pasture Management and Autumn Greenfeed

Seasonal Notes by the Extension Division

PREPARATIONS for winter feeding of dairy cows and ewes should receive attention now. In the higher-rainfall districts early-autumn topdressing is very effective in increasing the late-autumn and early-winter production of grass and thereby in raising winter carrying capacity; in the lower-rainfall areas dry autumns usually necessitate the provision of catch green cereal crops to provide additional feed for this period.

AUTUMN TOPDRESSING

IN the early days of phosphatic topdressing fertilisers were generally applied in spring, but farmers' experience and experimental work carried out by the Department of Agriculture soon demonstrated that early-autumn application gave similar total annual production and most useful increases in late autumn and early winter. Early-autumn topdressing raises winter carrying capacity. The feed in fields topdressed in March and closed in rotation in April, May, and early June can be held and used in winter.

NITROGEN TOPDRESSING

Autumn topdressing with phosphate and potash does much to ensure supplies of pasture for winter needs, but at times it is advisable to amplify these supplies by the application of quick-acting nitrogenous fertilisers, which will promote growth. As autumn topdressing and the closing of fields from April onward generally provide enough growth to supply the needs of dairy cows until the end of July or early August, it is for provision of feed mainly from mid-August to mid-September that nitrogen must be looked to. This period has always been the most difficult one for feed supplies. Nitrogen applied in July will promote feed in August and September, provided that the weather is not too cold. Application should be made to pastures with 2 to 3in. of growth and containing sufficient ryegrass, since this is the grass which can be depended on to produce winter growth if the weather is not too cold. Improvement in production from the nitrogen is assisted by applying phosphate with it; the suggested dressing is 2cwt. of serpentine or compounded superphosphate plus 1cwt. of sulphate of ammonia or compounded fertilisers supplying approximately the same amounts of nitrogen and phosphate in a quick-acting form. On town supply farms, where there is a great demand on winter pasturage, greater use could be made of nitrogen, which could be applied from May till July to promote winter growth of milk-producing feed. —*J. E. BELL*

* * *

CEREALS FOR GREENFEED

IN South Island arable farming districts the choice of cereal greenfeed crops depends largely on seasonal conditions. In dry autumns when feed is short quick-growing varieties such as Cape or Black Skinless barley should be sown in February immediately the stubbles can be cleared after harvest and should be cultivated for early autumn greenfeed. When late-autumn, winter, and early-spring feed are required Algerian or Winter Grey oats, Wong or Cape barley, or N.I.A.B. ryecorn should be sown in March. If soil moisture conditions are favourable and spring feed is particularly required, Italian ryegrass sown in March or early April on a ploughed and well-cultivated seed-bed may be used. The sowing of catch crop cereals on stubble land raises the problem of straw disposal. Where land is to be sown within a short time of harvesting, burning stubble becomes necessary to permit adequate cultivation. A clean burn with a hot fire is essential, and it pays to wait for a calm, dry day, which is more favourable and safer for burning off than windy weather. A simultaneous burn can be obtained by dragging a lighted torch of sacking soaked in waste oil around the fringe of the fire break ploughed round the perimeter of the paddock. Under dry conditions a suitable seed-bed for greenfeed sowing can be obtained on stubble land by grubbing, though where there is plenty of moisture available ploughing is preferable. —*W. L. OSBORN*

* * *

LUCERNE IN CANTERBURY

IT is generally understood that lucerne should be permitted to make and retain some growth before the dormant winter months, as this helps to protect the crowns of the plants and suppress grass growth. Late-winter management of the lucerne stand is not so widely understood, but many Canterbury farmers have proved the value of grazing in late winter and early spring. Under Canterbury conditions lucerne begins spring growth earlier than any of the grasses and clovers, but it is apparent that this early growth is not relished by stock. Sheep will eat grass into the ground before grazing the early-spring growth of lucerne. This has been particularly noticeable where cocksfoot or timothy has been sown in association with the legume, but the preference is also obvious with volunteer ryegrass and even with the poorer weed grasses. Such drastic treatment retards the growth of grass species, and if stock are removed from the paddock early in September, lucerne then makes rapid growth to the detriment of grasses and weeds. Grazing of lucerne has now become a general practice, and many farmers claim that the winter feeding of hay on a lucerne paddock is beneficial to the stand. In many cases this claim appears to be sound, but when grazing is done during the growing season care must be exercised, for during this period continuous close grazing will not only lower annual production but will also shorten the life of the lucerne stand. —*E. G. SMITH*

* * *

GRAZING NEW PASTURES ON DAIRY FARMS

THE productivity of a pasture depends to a large degree on the treatment it receives in its early life, so the management of new pastures is important. New pastures, whether spring or autumn sown, should not be allowed to grow longer than 5 or 6in. until the clover becomes well established. If allowed to get too long, the quicker-growing grasses smother out the slower-establishing clovers on which depends the ultimate production of the pasture. The initial grazings should be carried out with light dairy stock or sheep so as not to pug up the pasture. It is also preferable to use large numbers of stock to eat down the paddock quickly and evenly. If sufficient numbers of young dairy stock are not available to control the pasture, the use of an electric fence to break feed the paddock is necessary. If the new pastures are grazed by dairy stock, they should be chain harrowed immediately after each grazing to spread the droppings. New pastures frequently respond to an extra dressing of phosphate in the first year of establishment. If the new pasture requires potash, best results will be obtained by applying this manure in spring or autumn. Lime can be applied at any time of the year. —*N. A. CLARKE*

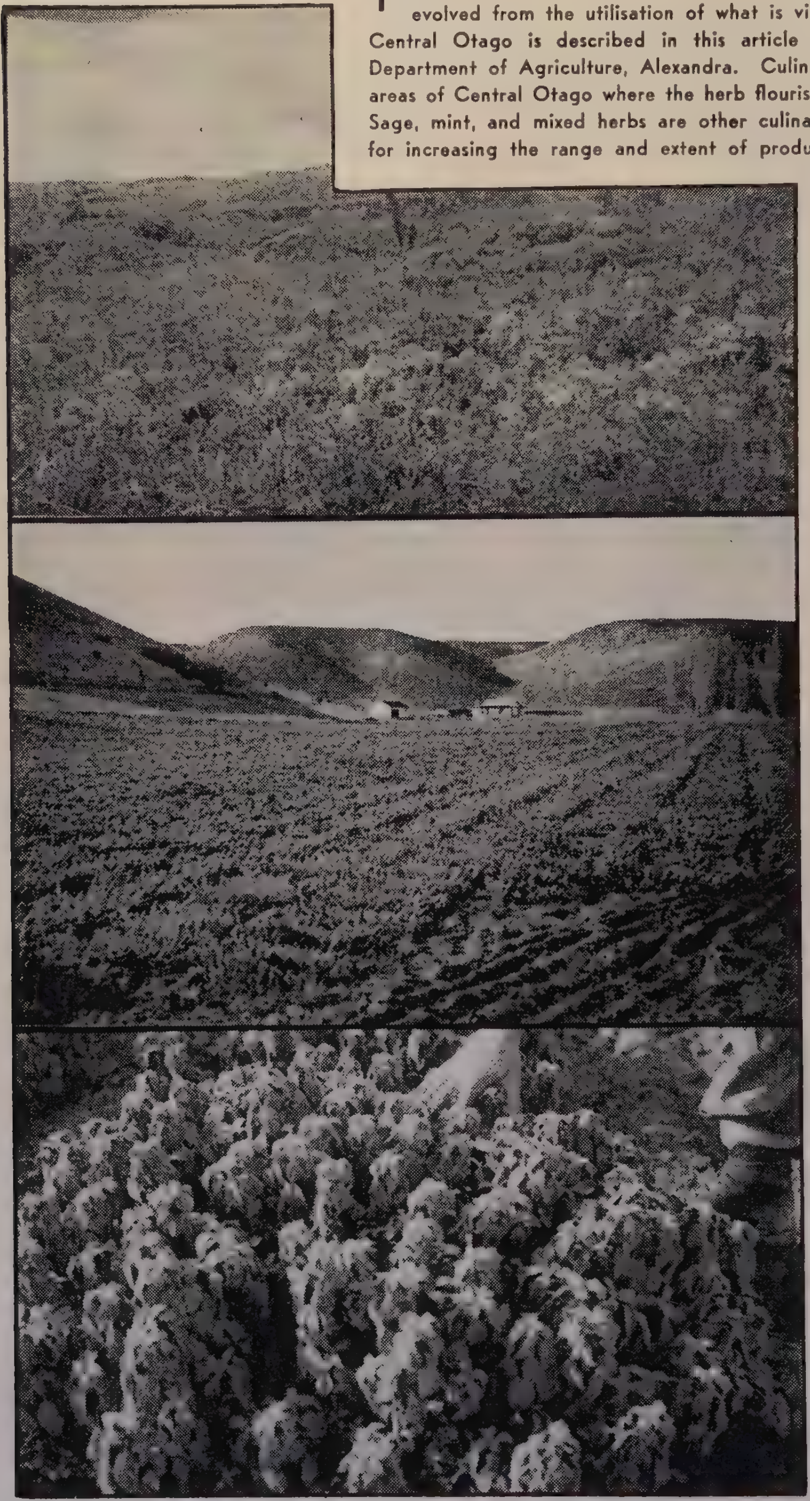
* * *

GIANT DISCING HILL COUNTRY

THE first discing of surface-sown hill country in preparation for resowing to grass either direct or after a forage crop is usually given between March and June. This first discing moves only part of the soil, but in so doing allows partial fallowing without risk of erosion. If a forage crop is to be taken, subsequent working down will take place in August or September, or if the paddock is to be sown straight to grass, seed-bed preparation can be made between October and February as opportunity permits. Giant discing provides a reasonably efficient, economical, and rapid method of bringing into production much land that is too steep to plough and yet too valuable to leave in inferior pasture or native covering. This method of land development must rank in importance with topdressing, oversowing, and subdivision in the further development of hill country. —*L. H. ALSOP*

Culinary Herb Production: A Unique New Zealand Industry

THE establishment of an industry, the only one of its kind in New Zealand, which has evolved from the utilisation of what is virtually a weed growing over large areas of Central Otago is described in this article by W. S. Kemp, Horticultural Instructor, Department of Agriculture, Alexandra. Culinary thyme harvested principally from many areas of Central Otago where the herb flourishes in a wild state is the principal product. Sage, mint, and mixed herbs are other culinary preparations packed, and other avenues for increasing the range and extent of production are evident.



Upper—Thyme growth in Central Otago. Looking up the Raggedy Range from Ophir. Middle—Area in sage. Lower—Sage plant.

OVER many parts of Central Otago, particularly between Ophir and Clyde, thyme (*Thymus vulgaris* L.) flourishes in a wild state. There in early summer it blossoms into a rolling sea of varied purples, loading each breeze with its fragrance. It probably owes its introduction in the Ophir district to the early miners who planted it in their gardens. When these were abandoned this self-seeding plant, finding the climate and light dry gravelly soils eminently suitable, survived and flourished. It was not until the 1920s that it began to appear in the Alexandra-Clyde basin and its spread in this area is due a lot to the efforts of an old miner who used to collect seed and spread it in new areas.

For years no doubt many people talked of the commercial possibilities of thyme, while local residents made use of it for culinary and other purposes. However, it was not until 1944 that the first step was taken to make use of it commercially. In that year the late Mr. Burberry, of Clyde, having faith in its commercial possibilities and having managed to interest a distributor, began in a small way to gather this herb and prepare it for culinary use. Unfortunately, however, he did not live to see the fulfilment of his endeavours.

Thyme, however, is only one of many culinary spices and it was realised that if the venture was to flourish, it would be necessary to enlarge the range of products. With this in mind a small company was formed in 1946.

Land was acquired close to Clyde and on it the planting of sage (*Salvia officinalis* L.) was begun and today there are approximately 10 acres under cultivation. Sage is much less hardy than thyme and cultivation and irrigation are necessary to keep it in production. Mint (*Mentha* sp.) is another common herb which has spread from home gardens and can be found growing wild in many parts of the district where conditions are favourable. This is also gathered and processed by the company. It is planned to increase the range of the company's products still further by including marjoram (*Origanum onitis*) and horse-radish (*Cochlearia armoracia*).

Today the range of products comprises thyme, sage, mint, and mixed herbs. The last mentioned at present comprises thyme and sage. Marjoram will be added later. Mint was tried in the mixture, but it proved to be too strongly flavoured and so its use had to be discontinued.

Sage, mint, and thyme were originally all cut by hand, a pair of heavy shears being used. This work was done by local residents and the purchase price paid by the company varied according to quality. This method, however, was slow and laborious and prices paid had to be high to encourage the harvesting of sufficient quantities. It was thought that as there were some areas of reasonably flat ground thickly covered, mechanical harvesting of sage and thyme should be possible. A pick-up baler was tried out on the sage, but proved unsuitable, as much of the leaf, the only useful part of the plant, was lost in the process. A horse-drawn mower was then fitted with a catcher constructed along lines similar to that on a garden lawn mower and this has proved very satisfactory, speeding up harvesting operations. Considerable quantities of thyme, however, must still be cut by hand, as much of it is found growing in broken, rocky country and on steep faces where mechanical harvesting is impossible.

When harvested the thyme is brought to the factory and spread out on a concrete area to dry. With frequent turnings in the hot Central Otago sun the thyme usually requires only a few days to dry. With sage and mint, however, the drying procedure has to be varied. The larger, succulent leaves of these plants, if sun dried, become discoloured and even blackened and of poor quality. To overcome this the drying takes place under cover, the material being spread thinly on racks. Usually this operation requires only a few days, especially during the height of summer, but during the colder weather artificial heat is necessary. Some thyme, particularly that harvested early or late in the season, is dried in this way also.

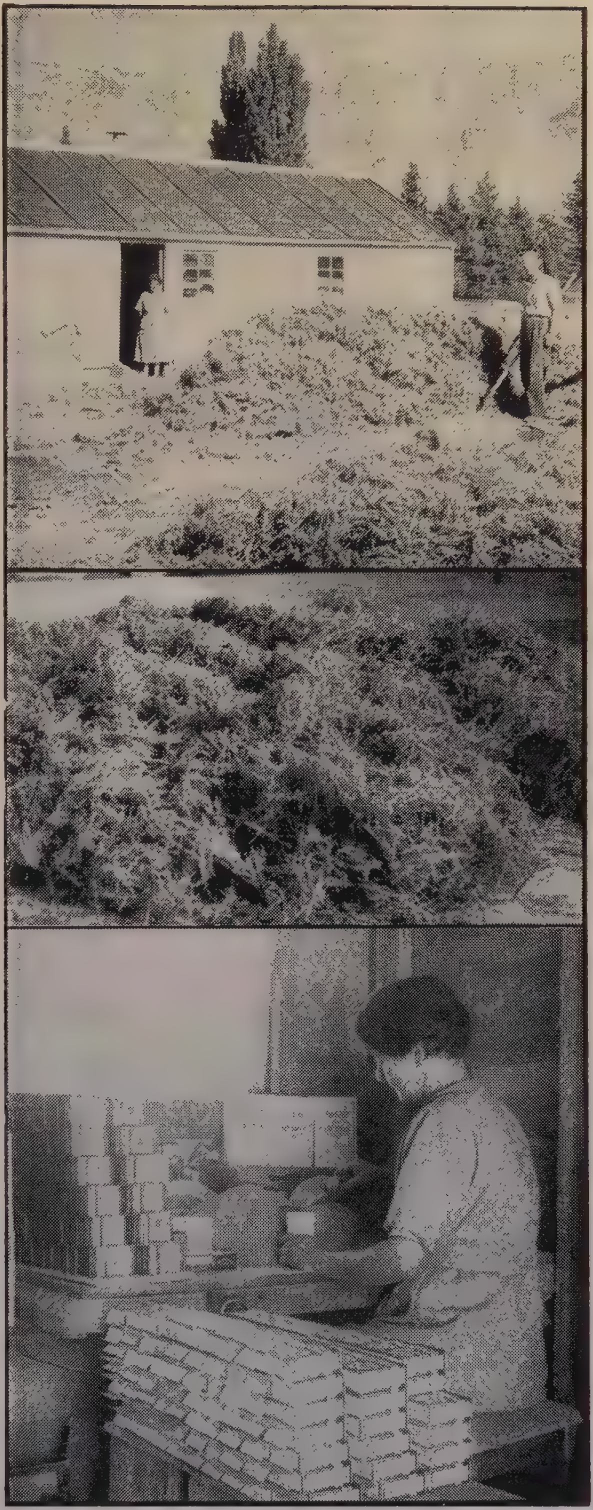
From the drying floor the material passes to the next process in which it is put through a stripping machine to separate the leaves from the stalks. The latter, being of no value, are burnt. The leaf is then passed through a seed cleaner to remove any dust or foreign matter. The pure dried leaf then passes through a mill and is ground to the required size. The product is hand packed into 1oz. packets for the domestic trade or into larger containers for use in making butchers' smallgoods, for which it is reduced to a very fine powder. The packets are placed in cartons holding a dozen and these are packed into larger containers holding a gross, and bulk lots are packed into crates holding 1cwt. The bulk of the output is disposed of in the North Island.

At present the industry is very small, employing two people full time and another two during the height of the season. To the 40 or 50 suppliers of thyme and mint, some of whom send in only small quantities and others harvest considerable amounts, the industry has become a profitable and pleasant sideline.

Production has slowly expanded and output has trebled since 1947. If present expectations are fulfilled, there should be a still greater increase in the future. The main difficulties are the limited local market and competition from sources outside New Zealand which, aided by such factors as greater home demand, favourable exchange rates, or cheap labour, are able to place their products on this market at favourable rates. Some inquiries from Australia have been received, however, and it may yet prove possible to develop an export trade.

So far this industry has interested itself in the production of culinary herbs only. The climate and soil of Central Otago, judging by the extent of growth of some species, are particularly suited to many plants useful for medicine also. Borage, mullein, horehound, and foxglove are some of the many which can be found growing wild in many parts. Thyme has uses other than for seasoning, stuffings, and sausage meats. Thymol, an extract from thyme, is a disinfectant much more powerful than carbolic acid and is non-poisonous to humans. Thyme is also useful for relieving chest complaints, being used in the manufacture of some cough mixtures. The common brier rose abounds throughout Central Otago. Each year many tons of rosehips are collected and railed to Dunedin, where they are manufactured into a syrup which has become part of most babies' diets.

The company can see many avenues for increasing the range and extent of its products, but is hindered by lack of finance and suitable facilities. On the initiative shown the industry deserves to prosper, but only time will show whether this budding secondary industry can be developed still further.



Upper—Thyme spread out to dry in the early stages of the company's existence and before the building of a drying room and concrete area for carrying out this work. Middle—Thyme spread out on concrete to dry. Lower—Packaging the prepared product.

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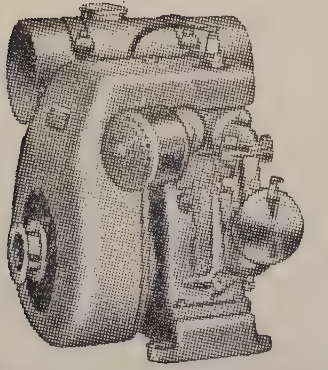

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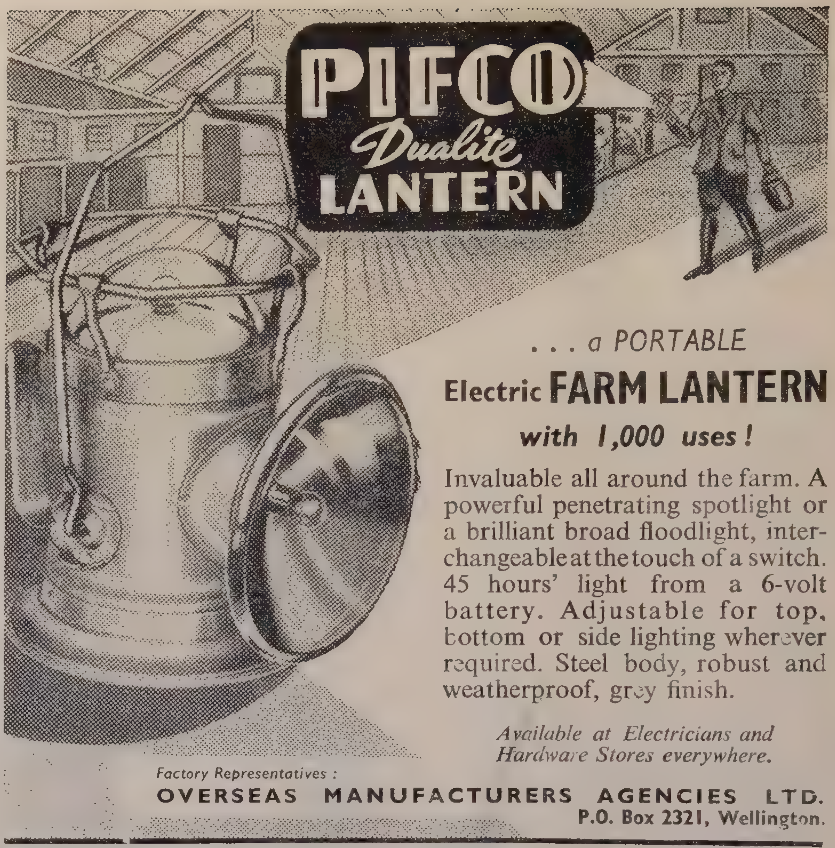

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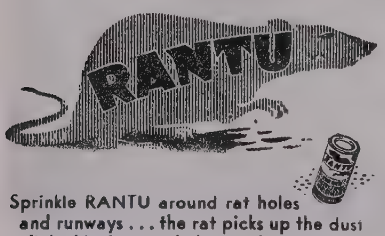

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The Home Orchard in Autumn

AUTUMN offers the home orchardist a little respite from routine work. The planning of new home orchards and the improvement of existing ones should be considered. Plans should be based primarily on family needs and personal tastes, but care should be taken to choose those fruits and varieties most likely to succeed in the district. The sowing of soil-improving crops is recommended. These points and several other aspects of home orchard management during autumn are discussed in this article by C. E. K. Fuller, Horticultural Instructor, Department of Agriculture, Hamilton.

BECAUSE the average housewife wants a reasonable amount of a wide variety of fruit over a long period, and not a large quantity of a few varieties, it is best to plan for sustained yield, not quantity.

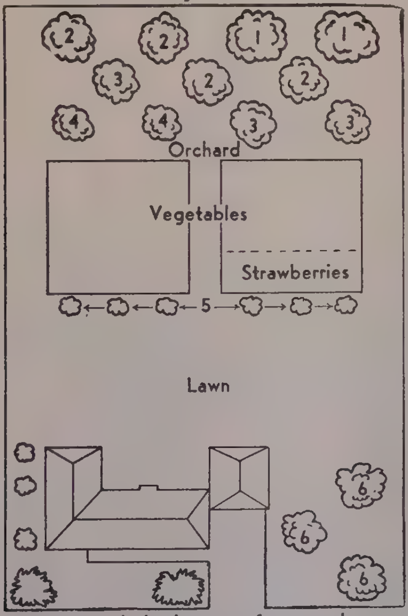
Some thought given to planning before planting will be repaid in an easily managed unit with continuity of harvesting of the various fruits. The home gardener about to establish a new garden is in an enviable position, for he can plan from the beginning for sustained yield. Where, however, fruit trees are already established, the home orchardist can re-arrange his orchard for easy managing as replanting becomes necessary over the years. With careful planning, particularly in northern districts, fruit may be had in one form or another throughout the year.

Suitability of Fruits

Only the types and varieties of fruits which suit the district (see upper table on next page) should be planted, keeping in mind the value of the fruits for dessert, stewing, jam, bottling, and storage, and allowing for personal preferences. Many failures in home orchards can be traced to the varieties planted not being suitable to the climate of the area. Every effort should be made to keep the similar types of fruit together; for example, pip fruits together and stone fruits together for easier spraying (see diagram below).

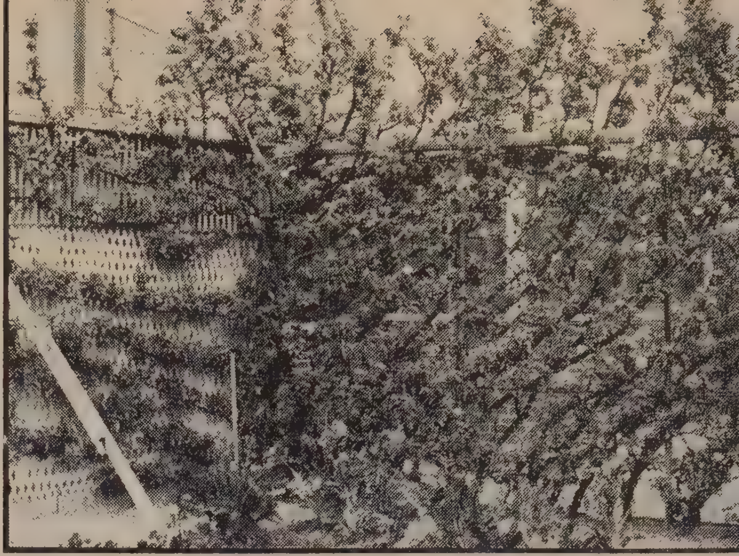
Size of Orchard

An orchard of 10 to 20 trees will furnish a family with a sufficient variety and abundance of fruit. If a plot is large enough for only 10 trees, no attempt should be made to crowd in more or disappointment will result. Trees are best planted 15ft. apart on the triangular system, and 8ft. from the fence is generally adequate, but care should be taken that trees next to fences are of an upright nature. Taller trees should be planted to the back, and smaller trees and trees of a spreading habit to the front. By judicious pruning backyard trees may be kept smaller than they normally would be.



Recommended layout for a home orchard. 1—Pears. 2—Apples. 3—Peaches. 4—Plums. 5—Dwarf trees to supplement apple supply. 6—Citrus (ornamentals). See table at the bottom of page 258 for recommended varieties.

Where space is limited fruit trees may be used as ornamentals around the house. Evergreen trees such as citrus and avocados are effective as ornamentals, and trees trained on the espalier system not only save room, but are ornamental as well. Dwarf apples are not only of value for small sections, but may also be used to give a greater choice of varieties.



[Green and Hahn Photography Ltd. photo.

Espalier-trained trees provide fruits, ornamentation, and privacy.

Home Storage of Apples and Pears

For the successful storage of home-grown apples and pears the following points are important:—

1. Fruit must never be stored in a wet condition.
2. A fine, dry day should always be selected for gathering the fruit.
3. Fruit should be handled carefully to avoid bruising.
4. Only thoroughly sound fruit, free from insect attack and disease, should be stored.
5. All stored fruit should be examined periodically, and the "spotted" and rotten ones removed.
6. Early pip fruits such as Gravenstein apples and Williams Bon Chretien pears are not adapted to home storage.
7. Young trees yield fruit of poor keeping quality which is not usually suitable for storing.

In April-May there is usually a fall of temperature, and conditions become favourable for the storage of fruit. The most advanced fruits of late-maturing apples and pears should be picked first. These are generally the largest fruits, but any other fruit which comes away readily when bent upward should also be taken. Pears are best picked on the green side and ripened off the trees in the dark, under which conditions they attain full flavour.

The fruit may be packed and stored in any place with a cool, even temperature (40 degrees to 45 degrees F. is ideal), but it must not be exposed to the risks of frosts. Good results can be obtained by placing the cases of fruit beneath hedges and trees where there is maximum air circulation, but still in a position where frosts cannot reach them.

The top case in a stack is best covered with a sack over which a piece of corrugated iron should be placed. The iron should overlap the sides and ends of the case and be at a slight angle to allow excess moisture to run off. Cases on the ground should be raised to allow free circulation of air beneath. This also applies to any fruit stored indoors.

Cover Crops

During the next few months cover crops should be sown. The advantages to be gained from cover cropping are:—

1. Improved soil condition, leading to easier cultivation, better water-holding capacity, and freer drainage of excess soil water.
2. The formation of a suitable environment for beneficial soil micro-organisms and earthworms.
3. Improvement of soil fertility.

VARIETIES OF TREES RECOMMENDED FOR SPECIFIC LOCATIONS

It is not possible to provide for all tastes, but the kinds and varieties of fruit listed in this article will serve as a guide from which a selection can be made to suit most conditions. Suitability to different districts is indicated in the tables by the following initials: A., Auckland; H., Hawkes Bay; W., Wellington-Taranaki; N., Nelson-Marlborough; C., Canterbury; and O., Otago-Southland. Under the heading "Use" D. means dessert and C. means culinary.

Apples

Variety	Use	Period of maturity	District
Irish Peach	D.	January	C.O.
Beauty of Bath	D.	January	C.O.
Gravenstein (either of the red strains, Albany Beauty or Oratia Beauty)	D.C.	January-February	A.H.W.N.C.O.
Mobbs Royal	C.	February-March	A.H.W.N.C.O.
Cox's Orange Pippin ..	D.	February-March	H.W.N.C.O.
Lord Wolseley	C.	February-March	C.O.
Kidd's Orange Red ..	D.	February-March	A.
Red Jonathan	D.	March	A.H.W.N.C.O.
Red Delicious	D.	March-April	H.W.N.C.O.
Golden Delicious	D.	March-April	A.H.W.N.C.O.
Rome Beauty	D.C.	April	A.H.W.N.C.O.
Reinette du Canada ..	D.C.	April	C.O.
Sturmer	D.C.	April-May	H.W.N.C.O.
Granny Smith	D.C.	April-May	A.H.W.N.C.O.
Ballarat	C.	May	A.H.W.N.C.O.

For the small home orchard the growing of two varieties of apples on one tree has much to commend it, but care should be taken to see that the varieties are equal in vigour. If one is a strong grower and the other weak, an unbalanced tree will probably result, with the stronger grower completely dominating the weaker.

Pears

Variety	Use	Period of maturity	District
Williams Bon Chretien ..	D.C.	February	A.H.W.N.C.O.
Beurre Bosc	D.C.	March	A.H.W.N.C.O.
Louise Bonne de Jersey .	D.	March	A.W.N.C.O.
Winter Cole	D.	March	A.H.W.N.C.O.
Winter Nelis	D.	April	C.O.
P. Barry	C.	April	A.H.W.N.

Williams Bon Chretien is the best of the pears for bottling, but for its satisfactory pollination some other variety such as Beurre Bosc, Louise Bonne de Jersey, or Winter Nelis is necessary.

Peaches

Variety	Use	Period of maturity	District
Briggs Red May	D. white flesh	December-January	A.H.W.N.C.O.
Mayflower ..	D. white flesh	December-January	C.O.
Hales Early ..	D. white flesh	January	C.O.
Wiggins ..	D. white flesh	January	A.H.W.N.C.O.
Paragon ..	D.C. yellow flesh	February	A.H.W.N.
Peregrine ..	D. white flesh	February	A.H.W.N.C.O.
Stark	D. white flesh	February-March	A.H.W.
Muir	D. yellow flesh	March	C.O.
Mary's Choice .	D. yellow flesh	March	A.H.W.N.C.O.
Golden Queen .	C. yellow flesh	March	A.H.W.N.C.O.
Osprey Improved	D. white flesh	March-April	A.
Hobb's Late ..	D.C. white flesh	April	A.W.N.C.O.

A novelty is Black Boy, with flesh and juice the colour of port wine and excellent for jam and bottling. Golden Queen and Mary's Choice are excellent bottling peaches.

Nectarines

Variety	Use	Period of maturity	District
Early Rivers	D.	February	A.H.W.N.C.O.
Goldmine	D.	February-March	A.H.W.N.C.O.
New Boy	D.	February-March	A.H.W.

Plums (Japanese and hybrids)

Variety	Use	Period of maturity	District
Wilson's Early	D.C.	December	A.H.W.N.
Early Jewel	D.	December-January	A.H.W.N.
Sharp's Early	D.C.	January	N.C.O.
Billington (red-fleshed) ..	D.C.	January	A.H.W.N.C.O.
Burbank	D.C.	January	A.H.W.N.C.O.
Santa Rosa	D.	January-February	A.H.W.N.C.O.
Sultan (red-fleshed) ..	D.	February-March	A.H.W.N.
Purple King	D.	February-March	C.O.
Victory	D.	March-April	A.H.W.N.C.O.

Plums (European)

Variety	Use	Period of maturity	District
Angelina Burdett ..	D.	February-March	H.W.N.C.O.
Evans Early	D.C.	January	
Reine Claude de Vavay ..	D.	January	
Kirkes	D.	March	
Grand Duke	D.	March	
Monarch	D.	March	
Yellow Magnum Bonum .	C.	March	
President	D.	March	

Apricots

Variety	Period of maturity	District
Newcastle	January	N.C.O.
Dundonald	January-February	
Moorpark	February	

Cherries

Variety	Period of maturity	District
Early Lyons	Early	C.O.
Bedford Prolific	Mid-season	
Florence	Late	
St. Margaret	Late	

Quinces

Variety	Period of maturity	District
Smyrna	Mid-season	A.H.W.N.C.O.
Champion	Mid-season	

European plums, apricots, and cherries do not fruit satisfactorily in the milder climates of the North Island and are not recommended for those districts, with the exception of some parts of Wellington and Hawkes Bay. For satisfactory pollination of European plums more than one variety should be planted.

Berry and Sub-tropical Fruits

Berry Fruits

Berry fruits such as raspberries and currants do not fruit satisfactorily in the northern districts of the North Island, and even gooseberries seldom fruit well north of the Waikato district.

For districts where these fruits do well the following varieties are recommended:—

Gooseberries: Farmer's Glory (red), Gregory's Perfection (yellowish green), Ploughboy (red).

Raspberries: Lloyd George, Fillbasket, and in Nelson and Otago only Red Antwerp.

Black currants: Boskoop Giant, Daniel's September.

Red currants: Fay's Prolific.

Loganberries and strawberries can be grown in most parts of New Zealand. The following varieties are recommended:—

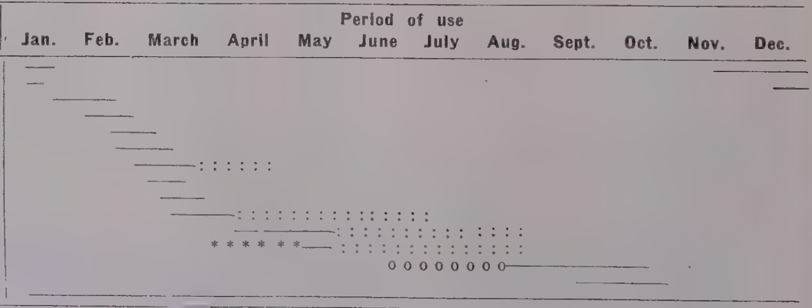
Loganberries: Red Logan.

Strawberries: Auckland district: Captain Cook, Helensiea Surprise. Other parts of North Island: Auchincruive Climax, Captain Cook, Melba. South Island: Melba, Chapman's Seedling, Auchincruive Climax.

Sub-tropical Fruits

Sub-tropical fruits require mild winter climates, but given well-sheltered, warm conditions they can be grown with reasonable success even in districts which experience several degrees of frost. Elsewhere in this issue details are given of the growing of citrus and sub-tropical fruits.

MANAGEMENT METHOD FOR OBTAINING SUSTAINED YIELD OF FRUIT VARIETIES SUITABLE FOR A NORTHERN CLIMATE



Kind	Variety	Use
Strawberry ..	Captain Cook	D.C.
Peach	Le Vainqueur	D.
Apple	Albany Beauty	D.C.
Plum (Japanese)	Sultan	D.C.
Pear	Williams Bon Chretien	D.C.
Peach	Paragon	D.C.
Apple	Kidd's Orange Red ..	D.
Plum	G. Wilson	D.C.
Peach	Golden Queen	C.
Pear	Winter Cole	D.
Apple	Granny Smith	D.C.
Apple	Ballarat	C.
Grapefruit ..	Morrison's Seedless ..	D.C.
Sweet orange ..	Carters Navel	D.
Lemon ..	Lisbon	C.

Legend: ———————— harvest period; : : : : : : approximate storage life; * * * * * * pick large fruit; o o o o o o marmalade fruit.

Suitable cover crops are mustard, rape, barley, field peas, vetches, oats, tares, and blue lupins. Leguminous plants are particularly valuable, because they add nitrogen to the soil. Cereals form a good amount of humus when turned under, and their high fibrous content is of great benefit in keeping heavy soils open and friable.

Phosphatic fertiliser applied with seed at the time of sowing ensures a good bulk of the green crop and enriches the soil at the same time.

Pest and Disease Control

Citrus

Late in May trees should be sprayed with Bordeaux mixture 3 : 4 : 50 (4oz. of bluestone, 5¼oz. of hydrated lime, 4 gallons of water) plus summer oil (1 pint to 4 gallons) for the control of brown rot, verrucosis, wither tip, and hard wax scale.

Passion Fruit

For the control of grease spot in late crops passion fruit should be sprayed with Bordeaux mixture 3 : 4 : 50 (4oz. of bluestone, 5¼oz. of hydrated lime, 4 gallons of water) at monthly intervals from April to June.

Pip and Stone Fruits

Disease control on pip and stone fruit trees may be assisted by applying at the leaf fall stage a 5 : 4 : 50 Bordeaux mixture (6½oz. of bluestone, 5¼oz. of hydrated lime, 4 gallons of water).

[*J. Walter Thompson Advertising Studios photo.*

A 15-year-old dwarf apple tree with a good crop.

[*Sparrow Industrial Pictures Ltd. photo.*

Well-spaced trees in a home orchard.

Treatment for Raspberries

Pruning

Except for the variety Lloyd George, it is recommended that pruning of raspberry canes be carried out as soon as the fruit has been harvested. This allows the retained canes to be fully exposed to the sunshine, which will assist in ripening them.

Raspberries bear fruit on the canes produced the previous season. Pruning consists of the removal at ground level of all canes which have had crops, together with any weakly or diseased ones of the current season's growth. From six to eight canes are usually sufficient to carry the crop.

Spraying

Bordeaux mixture 3 : 4 : 50 (4oz. of bluestone, 5¼oz. of hydrated lime, 4 gallons of water) plus lead arsenate (1¼oz. to each 4 gallons of Bordeaux mixture) should be applied for the control of leaf spot and raspberry bud moth. This treatment is suitable also for loganberries and boysenberries.

Orchard Hygiene

Orchard hygiene is an essential part of disease control. All fallen fruits should be picked up from beneath the trees, and if of little value, destroyed, as they are excellent over-wintering hosts for diseases.

Causes of Non-fruiting

Fruit trees do not always bear fruit when the grower expects it. Several of the causes of failure to produce fruit are:—

1. The tree is not old enough. The different varieties and types of fruit vary greatly in the age at which they begin bearing.
2. The blossoms are killed or injured by spring frosts.
3. The variety may require cross pollinating by another variety.
4. The tree may be sickly because of disease or unsuitable soil conditions.
5. Severe pruning may have delayed fruiting or removed the fruiting wood.

Reference

New Zealand Department of Agriculture Bulletin No. 310, "The Home Orchard", by R. G. Hamilton.

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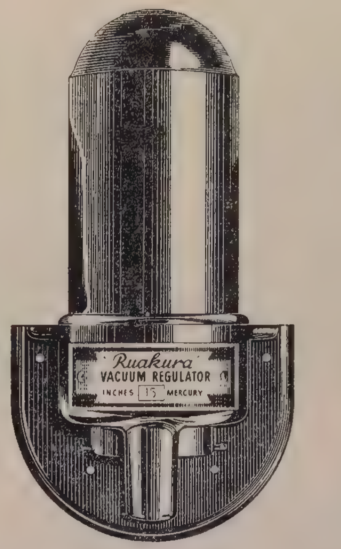

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Recent Research Work

T.C.A. AND I.P.C. WEEDKILLERS

TWO grass-killing preparations T.C.A. (sodium salt of trichloroacetic acid) and I.P.C. (isopropyl-N-phenyl carbamate) have proved very efficient in the eradication of weedy grasses such as couch, creeping fog, and wild oats. Trials have shown that T.C.A. controls both annual and perennial grasses and that I.P.C. is mainly effective against seedlings of annual and perennial grasses. These chemicals are largely absorbed through the roots of grasses and are particularly effective when applied directly to the soil in conjunction with cultivation. T.C.A. is very soluble and is leached in soils of low colloidal content such as sands. The toxic effect in the soil is shorter than that of I.P.C. In view of these desirable features observational trials were laid down on a range of non-grass crops at the Department of Agriculture Invermay Research Station on the Taieri Plains to test whether the crops treated would be susceptible to the grass-killing preparations. The crops included potatoes, peas, linseed, swedes, rape, lucerne, white clover, red clover, and subterranean clover.

TRIALS AT INVERMAY

TRIALS were made on soil types sufficiently high in colloidal content to inhibit excessive leaching of T.C.A. The times of application varied according to the crop, but the basic plan was to apply the chemicals at the following growth stages: Pre-emergence (that is, after the crop is sown but before it emerges); after the seed-leaf stage or 0 to 4in. stage; and on semi-mature plants. T.C.A. and the emulsifiable form of I.P.C. were applied as a spray solution. T.C.A. was applied at 5, 10, and 20lb. per acre and I.P.C. at 1, 2, and 4lb. per acre, these rates being sufficient to arrest the germination and kill seedlings of annual and perennial grasses.

CROP TOLERANCE

Of the crops treated at the pre-emergence stage potatoes and rape were not affected by either preparation. Clovers, particularly subterranean clover, were severely affected by T.C.A. treatments. I.P.C. had no effect. At the 0 to 4in. stage potatoes, peas, swedes, and rape were little affected by low rates of T.C.A. and I.P.C., but were scorched or burnt with the higher rates, burning being most severe with high rates of I.P.C. Past the seed-leaf stage clovers and lucerne were not checked by the low rates of application of T.C.A., but were drastically burnt at the high rates of T.C.A. I.P.C. had no adverse effects on clovers. At the semi-mature stage rape, swedes, and peas were unaffected by T.C.A., but were checked by the higher rates of I.P.C. Potatoes and linseed were damaged, particularly by the high rates of I.P.C.

USE OF T.C.A. AND I.P.C.

The trials have shown that T.C.A. and I.P.C. when applied to the foliage of the plants have a contact action resulting in a depression of most crops, particularly at the later stage of growth. T.C.A. has a caustic action that is less severe than the contact burn caused by the solvent employed in the the emulsifiable form of I.P.C. In view of these effects the chemicals should be applied before the crop emerges, as they then fall directly on the soil, where they are used to the best advantage and no depression of the crop results. Applied early to the soil the chemicals inhibit the grasses and some weeds such as spurrey from germinating. The trials showed that peas and potatoes were quite tolerant to pre-emergence applications of T.C.A. and I.P.C. Clovers and lucerne in the establishing stage were quite susceptible to T.C.A. but not to I.P.C. Different members of the pea family reacted differently to T.C.A., peas tolerating up to 20lb. per acre, lucerne tolerating 10lb. per acre, and clovers being susceptible even to 5lb. per acre. These trials also showed that spurrey could be killed by the high rates of I.P.C. and T.C.A. As brassica crops are relatively resistant to these chemicals, the trials showed a means of eradicating spurrey from brassicas.

—*J. N. FITZGERALD*

* * * *

PEAT AND MOISTURE

FIELD trials at the Rukuhia Soil Research Station have shown that peat land should be kept as moist as possible during summer. A high moisture content is required for optimum plant growth and once peat has dried out it takes a long time to re-wet. In experimental plots water is pumped into open drains in summer and the moisture content kept just under saturation. Although at first glance the peat seems far too wet for plant growth close to the drain, luxurious growth is obtained. To obtain some preliminary data on moisture requirements of peat a pot trial was recently concluded at Rukuhia. Three perennial ryegrass seeds and two white clover seeds were sown in each pot of peat after adequate amounts of lime, phosphates, and potash had been added. After the whole series of pots had established a good cover different moisture levels were maintained in different groups. This was done by weighing each pot daily and adding water where necessary. The grasses and clovers were cut and the following weights recorded:—

Per cent. moisture in peat	Yields (grammes)
120	0.5
180	0.4
240	0.7
395	1.2
450 (saturation)	0.9

The method usually used in expressing the amount of water present in soils was used with the peat; that is, the figure represents the percentage based on dry peat. Thus, if 100 gms. of moist peat (peat + water) when dried lose 80 gms. of water, the 20 gms. of dry soil is used as a basis for percentage calculations;

$$\text{thus } \frac{80}{20} \times 100, \text{ which is } 400.$$

These figures were obtained from fairly raw peat. The higher the decomposition is the lower the water-holding capacity of the peat will be. On the other hand peats with 8 to 10 times their weight in moisture were recorded.

—*J. ADAM*

* * * *

SERPENTINE AND REVERTED SUPERPHOSPHATE

IN a comprehensive trial recently concluded at the Winton Experimental Farm pasture production was measured for 4 years from replicated fields treated each year with either 3cwt. per acre of serpentine superphosphate or 3cwt. of reverted superphosphate. There was no significant difference between herbage production yields from these two treatments, nor did a comparison of sheep grazing days, lamb weight gains, ewe weights, or weight of wool produced show any marked difference. In all fields a pasture dominantly perennial ryegrass and white clover was maintained for the trial period. For pasture topdressing under Southland conditions as represented by this trial at the Winton Experimental Farm serpentine superphosphate can be expected to give results equivalent to those from reverted superphosphate.

—*P. B. LYNCH*

Wines and Wine Making

IN New Zealand approximately 1100 acres are established in vineyards from which are produced about 700,000 gallons of wine per year. Most of this area is in Auckland, centring round Henderson, and Hawkes Bay. This article by F. Berry-Smith, Viticulturist, Department of Agriculture, Auckland, gives a brief account of the better-known types of wine and outlines wine-making procedure, more particularly in New Zealand.

WINE making is too comprehensive a subject to be dealt with fully in an article such as this, and a very brief description is all that is possible. For popular reading most of the technicalities have been purposely omitted, but sufficient information has been given for a general conception of how the various wines are made.

PORT WINE

The making of port wine originated in the Douro district of Portugal over 200 years ago to supply a stimulating wine to suit the cold climate of the British Isles. This wine was shipped from Oporto and became known as port wine. Wine of a similar type is now made in most other wine-making countries and sold as port wine.

The word port is therefore now used in a generic sense to designate a type of wine, namely a sweet, full-bodied, high-strength wine of a red or tawny colour. Other wine names such as claret, burgundy, sherry, madeira, and so on which once specifically applied to a wine from a certain place are also used in the same general way, much to the annoyance of the originators of these wines.

Fermenting Process

Port wine is made from a range of suitable red grape varieties. The first operation consists of crushing the grapes and removing the stalks in a grape mill. The grapes including the skins and seeds are then pumped into a fermenting vat. Elimination of the stalks at the outset is necessary, as if these were included in the fermentation, a harsh, astringent flavour would be imparted to the wine.

In the fermenting vat fermentation begins spontaneously as a result of the large number of yeast organisms naturally adhering to the waxy bloom of the grapes.

[*Photograph at top left by Sparrow Industrial Pictures Ltd.*
Top left—Juice in a vat being circulated to assist the extraction of colour from the grape skins. Above—Large wood storage vats used for maturing wines, particularly table wines, at Te Kauwhata.

When the vat is actively in ferment the liquid appears to be boiling because of the numerous gas bubbles. During fermentation the yeast cells attack the grape sugar and produce alcohol and carbon dioxide, the same gas as is used to sparkle or carbonate cool drinks and beer.

All the skins float as a thick layer on top of the fermenting juice and are plunged frequently to assist in the extraction of colour and flavouring. With most grape varieties all the colour is in the skins, and proper maceration of the skins with the juice is necessary to obtain a good red colour in the wine.

The skins are also plunged to prevent souring by vinegar-forming micro-organisms which become active if the floating cap of skins is exposed to the air too long.

In most of the larger wineries the laborious job of frequently plunging the skins in the fermenting vats is dispensed with by using what is known as a submerged head, which usually consists of two sets of slatted boards which when held in position by cross beams in the vat hold the mass of skins beneath the surface of the liquid. To facilitate extraction of colour from the skins under this arrangement a small electrically driven propeller is used to circulate the liquid.

During fermentation an appreciable amount of heat is generated. If the temperature of the vat rises much above 80 degrees F., the quality of the wine is likely to be impaired, and for this reason up-to-date wineries employ various cooling devices.

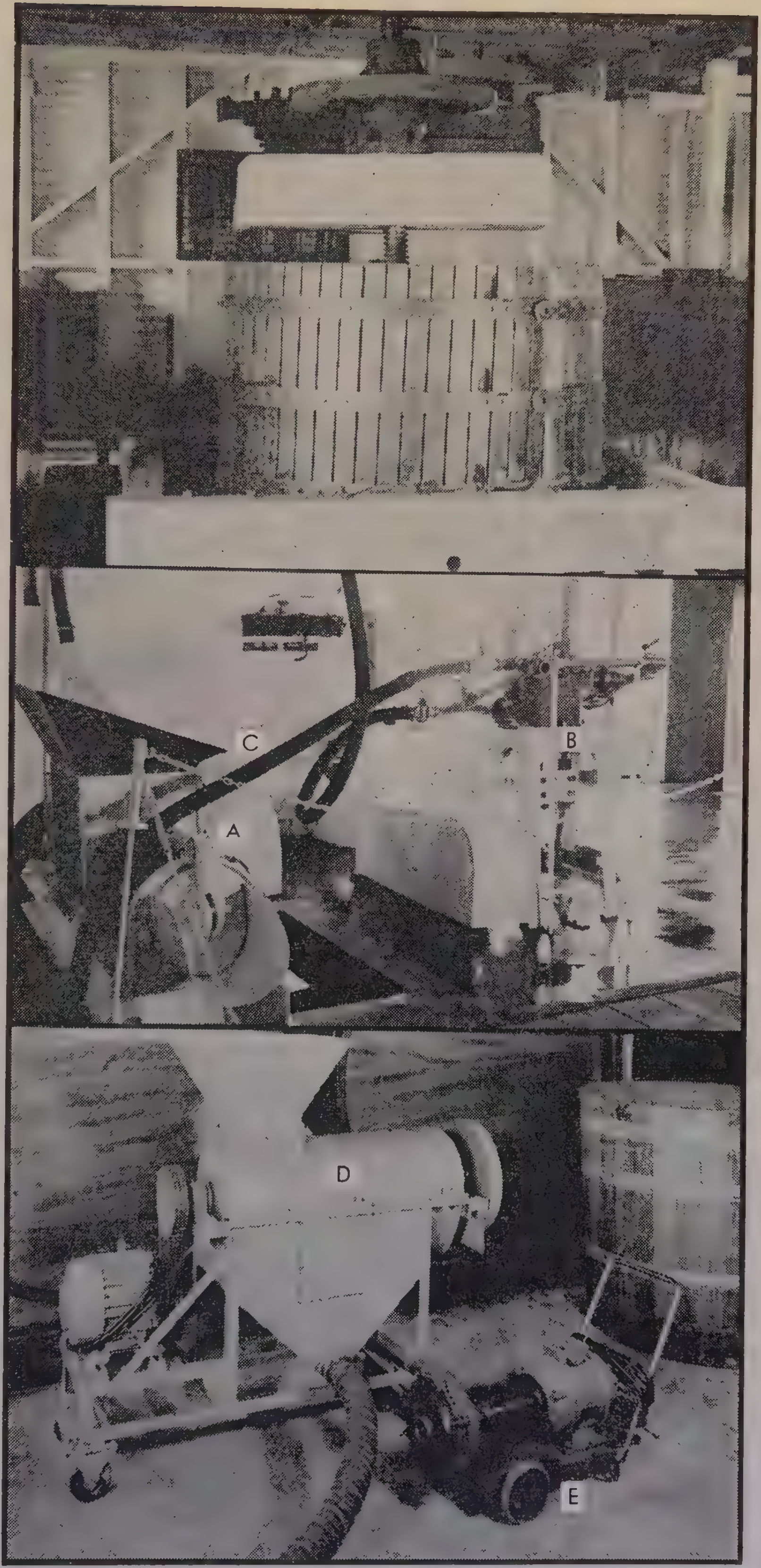
As New Zealand-grown grapes are deficient in natural sugar for making sweet wines, generally a calculated quantity of pure cane sugar is added to the fermenting vat. In the hotter wine-making countries such as Australia, South Africa, Spain, and Portugal the grapes possess a considerably higher sugar content and the addition of cane sugar in wine making is not necessary.

Fermentation is allowed to proceed for about 7 to 10 days, the time depending on the rate of fermentation, which is influenced by atmospheric temperatures. In cold weather the fermentation is slower than in warm weather. The course of fermentation is determined by the taking of regular tests of the temperature and the specific gravity. When sufficient colour has been extracted from the skins and the fermentation has slowed down through most of the sugar having been converted to alcohol the young wine is run from the fermenting vat to large storage casks.

A slow fermentation continues in the young wine for a few weeks. When fermentation ceases the wine partially clears itself through the deposition of yeast cells and other matter in suspension.

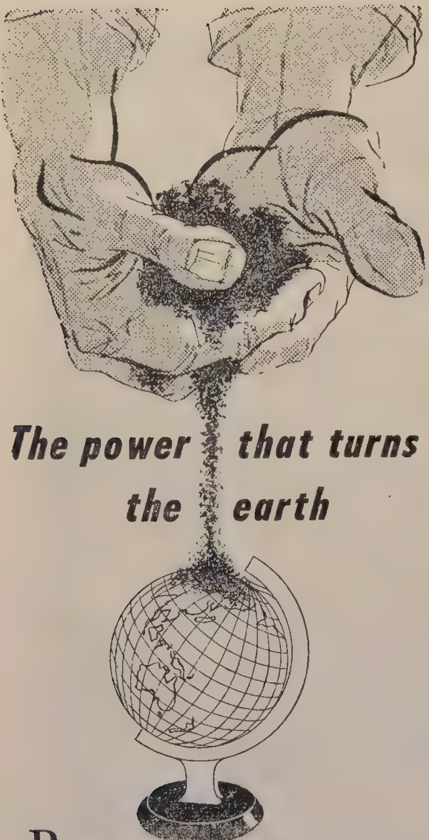
Fortifying and Clarifying

The wine is freed of this sediment by being transferred to another cask and at the same time having a quantity of fortifying spirit and a fining agent added to improve the clarity. Any one of a number of fining agents may be used, according to the judgment of the wine maker, but a special type of bentonite clay is most commonly employed to clear wines. The object of adding fortifying spirit, which is made by the distillation of low-grade dry wine and wine residues, is to increase the alcoholic strength of



Illustrations at right—Upper: A cage press used for making light white wines. Middle: A—A continuous screw press. B—A heavy-duty reversible must pump. C—A grape mill. Lower: D—A small grape mill. E—A small centrifugal must pump.

[*Upper and middle photographs by Russell Orr; lower by Sparrow Industrial Pictures Ltd.*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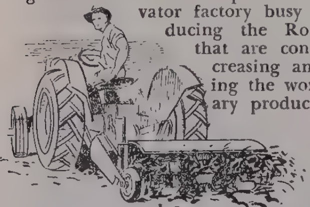

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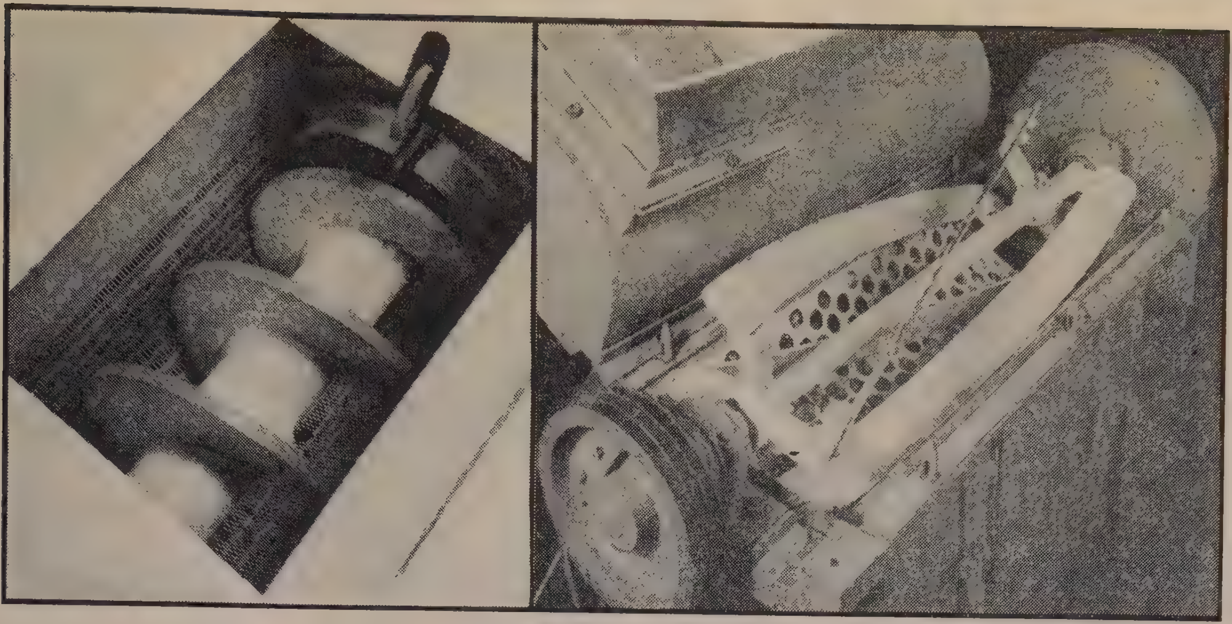


[*Sparrow Industrial Pictures Ltd. photos.*

Left—Interior of the hopper of a continuous press, showing the screw. Right—A grape mill with the cowling and hopper removed, showing the rotor which crushes the grapes and works the stalks out of the machine while the juice and skins fall into a sump below the grid.

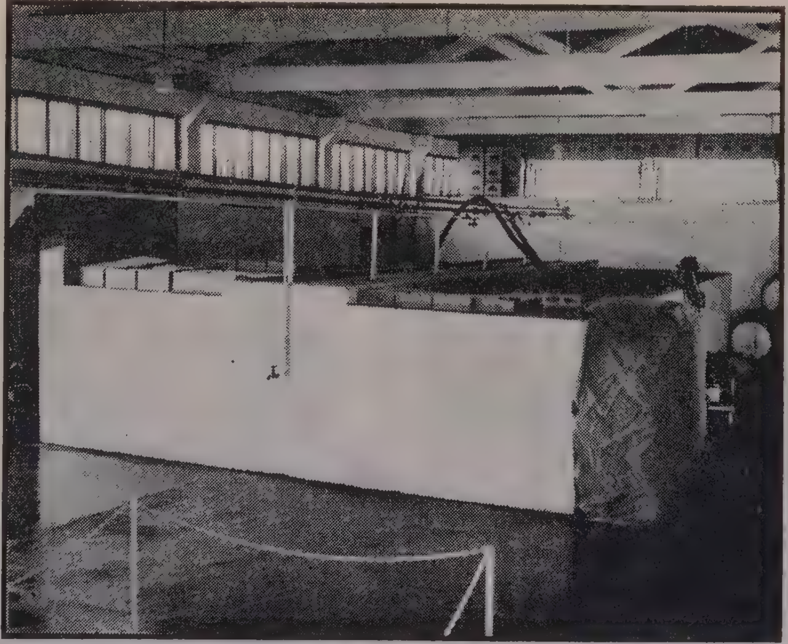
the wine to a degree which will prevent the possibility of a secondary fermentation. Unless a certain amount of spirit is added to the wine, it is likely to re-ferment in the bottles, turn cloudy, and blow the corks out. Only sufficient spirit is added to obviate this.

About 2 weeks are allowed for the finings to act, after which the clarified wine is removed, sweetened, and transferred to small wood storage casks to mature. A young wine is harsh and unpalatable, but with ageing gradually mellows and becomes smooth and palatable. Improvement increases with age up to a time when the wine reaches an acme of quality, after which it goes into a decline. Some wines improve for up to 20 years, but others are past their best in 10 years or less, depending on the original character.

Blending

When port wine has matured and mellowed after some years in storage it is almost ready for bottling. Usually when this stage is reached a blend is made of various port wines of different vintages to achieve a uniform standard of colour, sweetness, and flavour. Although made in precisely the same way from year to year, wines unavoidably show considerable variation, and blending before sale is essential to maintain a consistent standard. These remarks particularly apply to the general commercial grades. Wines in the exclusive class are bottled and labelled under the vintage year without being blended.

After blending wines usually go out of condition slightly and also usually require a few weeks for the various components of the blend to amalgamate their contributing flavours.



[*Russell Orr photo.*

A block of fermenting tanks. The footway down the centre of the vats carries must and cooling lines. This fermenting scheme and the machinery layout shown in the middle illustration on page 263 have a number of unique features and were designed by the author. Instead of the wine being drained from the vats after fermentation and the skins being extracted by hand in the usual way, the vats are plunged and all the contents pumped to the press. A light pressing separates the wine from the mixed skins and seeds. The must pump shown in the middle illustration on page 263 is easily reversed, and, without the line being uncoupled, the flow is directed from the fermenting vats to the press by the valves shown.

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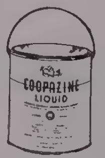

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After the blend has rested it is ready for filtration and bottling. The most commonly used type of filter is the pad and plate design, sometimes called a filter press. In this type the wine is pumped under pressure through a series of pads held in position by a number of metal plates screwed up tightly. The pads are a composition of asbestos and cellulose of very fine porosity. Filtration makes the wine brilliantly clear. Bottling and labelling complete its cellar life.

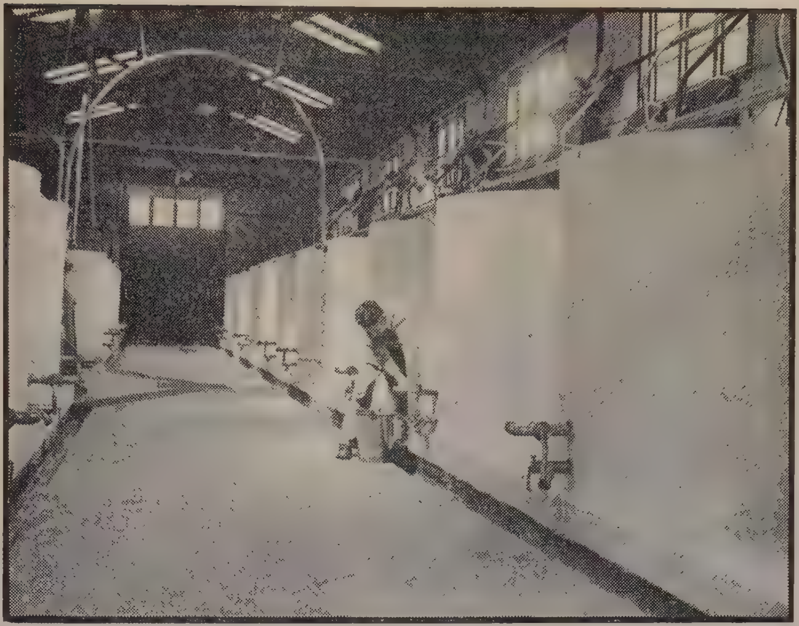
In countries other than New Zealand port wine is made by similar methods to that described. The main difference, however, is that cane sugar is not used overseas, thus making fortification necessary there at an early stage to kill the fermentation and leave sufficient natural sweetness in the finished wine.

Port wines are made in three classifications—vintage, tawny, and ruby.

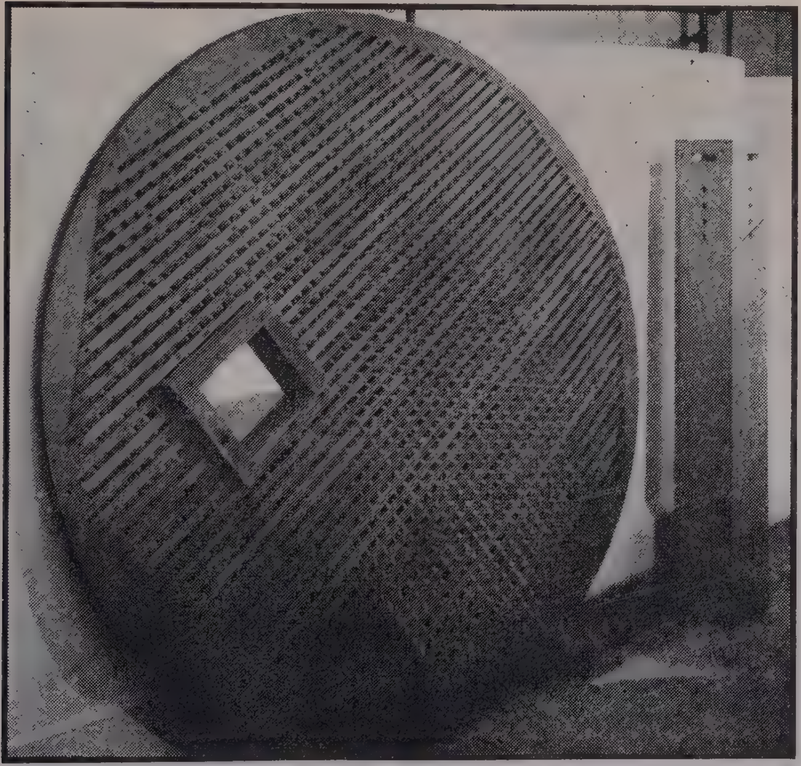
Vintage ports are bottled young and matured in the bottle. In the process of ageing a heavy crust is formed in the bottle. Through being kept in the bottle these wines retain the vintage character and full fruity flavour, ruby colour, and fine bouquet.

Tawny ports have been subjected to long ageing in wood instead of in the bottle, causing the colour to change from red to tawny.

Ruby ports stand half-way in character, as in treatment, between vintage and tawny.



A fermenting cellar at Te Kauwhata equipped with spun-concrete tanks. To insulate the concrete from the fermenting wine the vats are coated with a special grade of paraffin wax. The upper cocks on the vats are the debourbaging cocks, the handles of which are hanging down, and the lower cocks are the drainage cocks. Agitator motors are fixed above the vats.



[*Sparrow Industrial Pictures Ltd. photo.*

A type of submerged head used to keep skins submerged in the making of red wine. To the right of the head is a centre box used with an electrically operated propeller to circulate the contents of a vat.

SHERRY

Sherry wine originated in a vineyard area in the south-west of Spain centring round the town of Jerez de la Frontera in Andalusia. The word sherry is now also used to describe a fortified sweet or dry white wine of a similar character made in other wine-making countries.

Production Process

The basic steps in the production of sherry are:—

1. Crushing of the special white grape varieties and separation of stalks.
2. Pressing and draining of the must (juice, skins, and seeds).
3. Transferring of the juice from the press to an open vat and settling and drawing off of the clear juice, a process known as debourbaging.
4. Fermentation of the clarified juice with the addition of sugar.
5. Transfer of the juice to large casks where fermentation is completed.
6. Transferring or racking of the wine off the sediment (lees).
7. Addition of grape spirit and treatment with a fining agent to clarify.
8. Transfer of the sherry to small casks for maturing with or without the addition of sugar, depending on whether a dry or sweet sherry is required.
9. Blending, filtering, and bottling of the matured wine.

The procedure for making sherry has many features in common with the making of port previously described; therefore it will suffice to elaborate only the differences. Only those varieties of grapes which ripen with a low acidity and produce a refined wine free from any coarseness are suitable for sherry.

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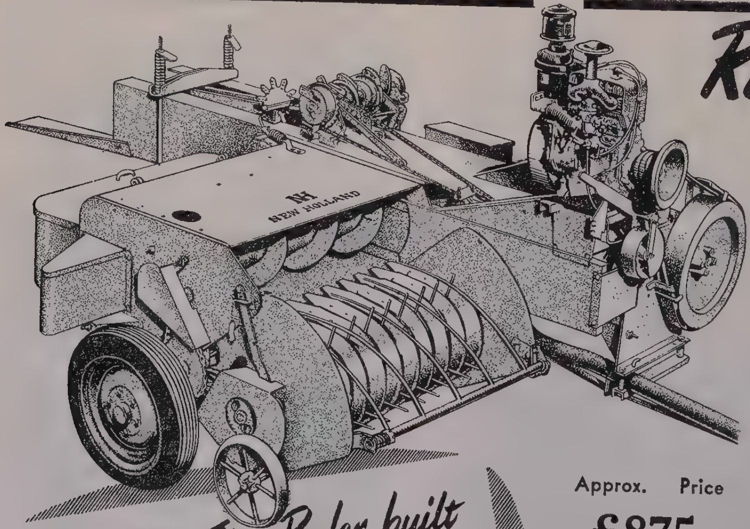

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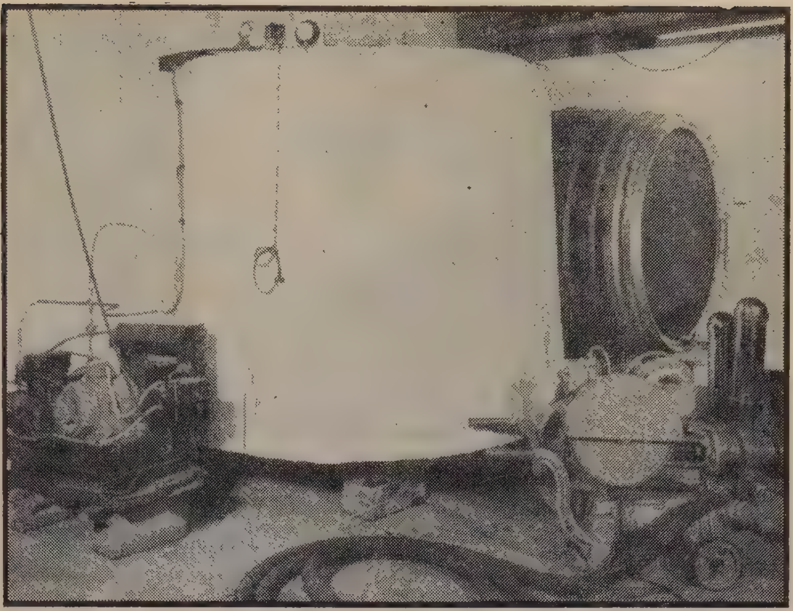
Sherry as well as all other white wines is fermented without inclusion of the grape skins, a step which enhances the delicacy of such wines. The juice is freed of the skins by draining and pressing the must from the grape mill. In some wineries continuous screw-type presses are used, but these are inferior to the basket press for white wines.

The best sherry is made from the first light pressings, the heavier pressings being used for lower grades.

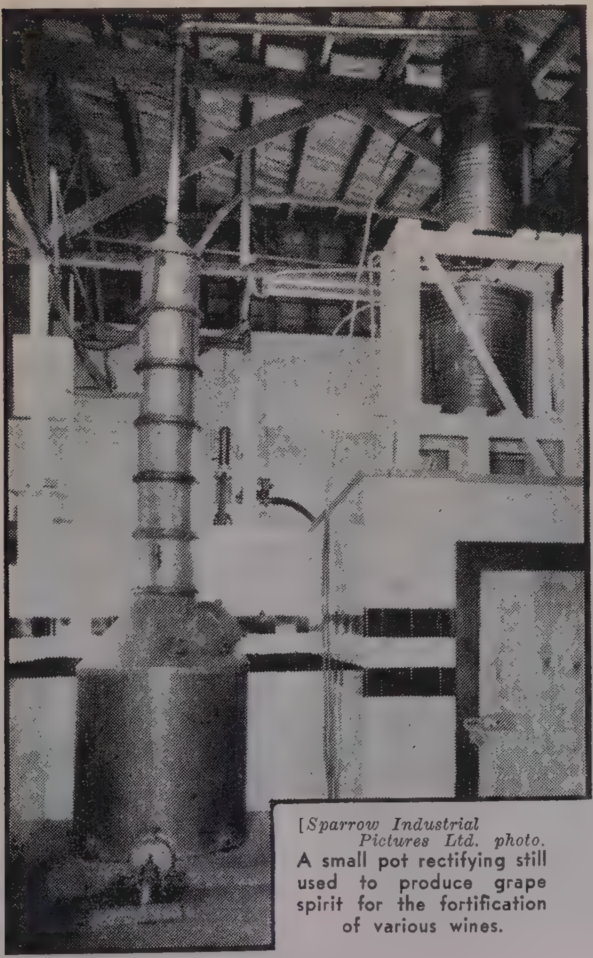
The juice from the press is pumped into open vessels to settle overnight. In this way much extraneous matter is eliminated and a better wine results. The clear juice is then pumped into another open tank to ferment. In the settling or debourbaging process most of the natural yeasts have been also eliminated, and cultured yeast is added to initiate a good fermentation. A certain amount of sugar is also added at this stage to correct the deficiency in the grapes.

Fermentation is allowed to continue for a few days in the open vat and is then completed in large casks. The rest of the treatment up to bottling, consisting of racking off the lees, fortifying, fining, blending, and filtering, is practically identical with that previously described for port wine.

Overseas the method of making sherry is similar to that described, the main difference being that sugar is not used, as the grapes have an adequate natural sugar content.



[*Sparrow Industrial Pictures Ltd. photo.*
A refrigerating unit for controlling fermentation temperature. At right is a mobile must pump for pumping lees or wine settlings.



[*Sparrow Industrial Pictures Ltd. photo.*
A small pot rectifying still used to produce grape spirit for the fortification of various wines.

Types of Sherry

Two main types of sherry have been established by the Spanish originators of this wine, namely fino and oloroso.

A true fino sherry is pale in colour and very delicate to the taste. Fino sherry is one which has been matured in small casks with flor yeast growing on the surface. To enable the flor to develop a limited amount only of spirit is added and the casks are only partially filled. The flor yeast spreads over the surface of the wine after inoculation to form a thick, creamy white film which after a period imparts a special character to the wine.

Oloroso sherry has been matured without the influence of the flor growth. This sherry matures more quickly than fino, has more colour, and is richer and fuller to the taste.

All sherries made in New Zealand are either sweet or dry oloroso types, as flor sherries have not been made in this country.

Montilla

Montilla wine comes from the Montilla district in Spain. The grapes from which this sherry is made grow on an unusual light coloured soil which is responsible for the unique character of the wine. Genuine Montilla sherry is a rarity, because very little is made.

Amontillado

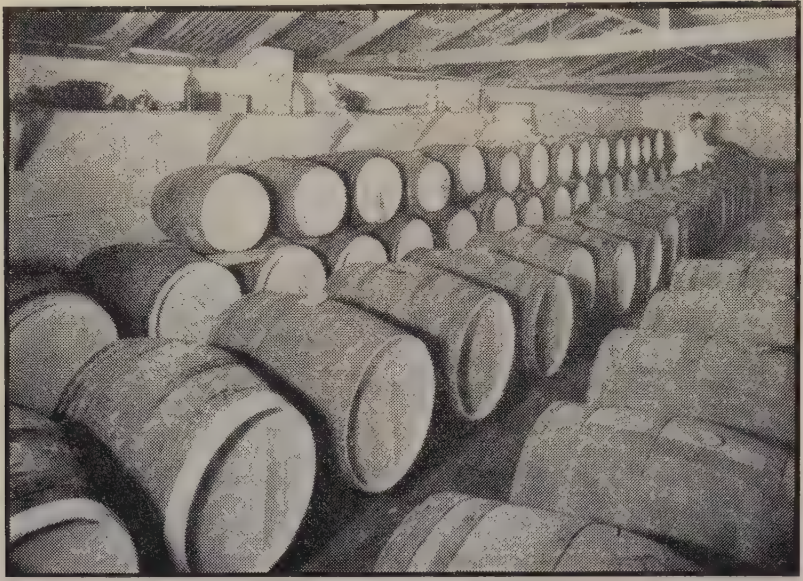
There is a story behind the origin of the name amontillado. Toward the end of the 18th century Montilla wine became well known and much admired in Jerez de la Frontera. The Jerez shippers made a wine to imitate the characteristics of Montilla wine and named it Amontillado. The word amontillado is used today to describe an aged fino sherry.

Marsala

A fairly well-known wine from Sicily, marsala is a sweet, fortified wine, made by methods similar to those used for sweet sherry. The base wine is sweetened with dark caramelised grape concentrate made by boiling down grape juice in open kettles. Marsala is fortified to about 17 to 24 per cent. alcohol and matured in the wood. It is sometimes referred to as Sicilian sweet sherry.

MADEIRA

Madeira is a white wine with a rich flavour and bouquet, produced on the Island of Madeira, a Portuguese possession lying about 350 miles off the coast of Morocco. Madeira wines vary



[*Sparrow Industrial Pictures Ltd. photo.*

Small wood storage for maturing fortified wines, especially sherries.

from sweet to dry in sugar content. The word madeira is sometimes used in other countries to label sweet white wines considered to have characteristics resembling those from Madeira.

Madeira is made by similar methods to those described for sweet sherry, special grape varieties being used.

MUSCAT

Most viticultural regions of the world make muscat wines.

They are made in much the same way as sweet sherry, muscat grape varieties being used. Very little muscat wine is made in New Zealand, because most of the grapes with a muscat character are too late to mature in our cool climate. Muscat wines are sweet, light brown in colour, and possess the typical fruity flavour of the muscat grape.

TABLE WINES

Claret

Claret is a dry red wine of low alcoholic strength which originated in the Bordeaux region of France.

The finest claret wines are still produced in Bordeaux, particularly the Medoc district, and the names of such wine-making establishments as the Chateau Lafite, Chateau Margaux, Chateau Latour, and so on are world renowned for claret of superlative quality. Fine wines such as these, however, represents only a small percentage of the total wine made in France. Most of the wine consumed by the people of France is a cheap, dry red wine of very ordinary quality known under the general classification of vin ordinaire.

Claret can be made from a number of red grape varieties, but it is generally recognised that a proportion of the variety Cabernet Sauvignon is essential to obtain a true claret character.

In New Zealand claret is made by the same general methods as described for port, except that no sugar, or very little, is required and the wine is not fortified. Having a low alcoholic strength, claret is more subject to spoilage than fortified wines and particular care in the making and storage of the finished wine is imperative. Any undue contact with air will destroy the delicate savour and bouquet and may result in the wine turning vinegary. For this reason claret in wood storage is regularly topped or in cellar terms the ullage is filled. To limit oxidation through permeation of air through the wood, the wine is stored in large wooden casks in a cool cellar.

Claret is usually given no more than 2 years in the wood before being bottled. All table wines are bottled at a comparatively early age and are matured in the bottle. The object of early bottling is to preserve the delicate primary flavours and fragrant aroma of the wine. With dessert wines long ageing in small casks under warm cellar conditions gives rise to the development of secondary flavours and what is termed a "rancio" character, caused by oxidation and other reactions in the wine.

Very little claret or other dry table wines are made in New Zealand, as these do not seem to appeal to popular taste. The average consumer in this country prefers sweet wines, for which reason no serious efforts have been made to produce table wines, even though the climate is more suitable for the making of these than sweet wines.

Burgundy

Burgundy in the first place was made in France in the vineyards of the Haute-Bourgogne (Cote d'Or), Basse-Bourgogne (including Yonne), Maconnaise (Saone et Loire), and Beaujolais (Rhone). Burgundies are generally fuller in body and of greater alcoholic strength than clarets, but in other respects are much similar.

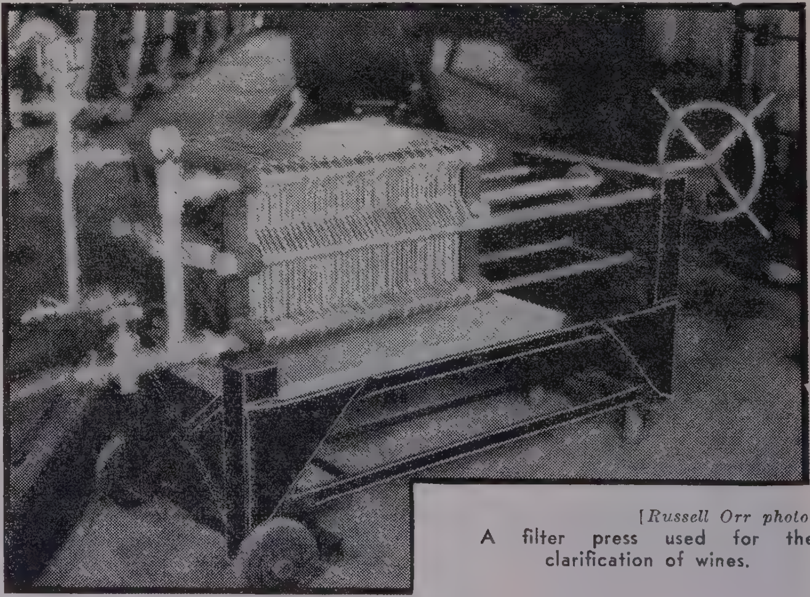
The most important grape variety used in the making of burgundy is the Pinot.

Hock

The word hock is derived from Hochheim or Hochheimer wines and is used in British countries to name light, dry white wines of high acidity and low alcohol content.

Germany has specialised in wines of this type for a long time and has received world recognition for achievements in this direction.

Germany's vineyards are in higher latitudes than any other commercial plantings in the world and the grapes are grown under adverse conditions. Grape growing is possible there only in certain favoured positions facing



[*Russell Orr photo.*

A filter press used for the clarification of wines.

the sun along the banks of the Rhine, Moselle, Main, and Saar.

The most noted of Germany's wine districts is known as the Rheingau, including the villages of Rudesheim, Geisenheim, Erbach, Johannisberg, Steinberg, Eltville, and others, all of which are well known to wine connoisseurs.

Strict labelling laws designed to protect the consumer apply to the German wines. The name of the village, the vineyard, the vintage year, and the name of the bottler appear on the label. In addition to this information the condition of the grapes when harvested is also indicated on the labels of fine wines. Thus "Auslese" wines are made from grapes selected for full maturity. "Beerenauslese" signifies that the grapes were selected individually for high sugar content, and such wines are likely to be sweet. As with the wines from the Sauternes district of France, the grey mould *Botrytis* is often a factor aiding in the concentration of the grape sugar, and "Spatlese" indicates a late picking of very ripe grapes in which the sugar has been concentrated by this grey mould.

"Trockenbeerenauslese" means that the grapes have been allowed to dry out on the vines to raisins, and these wines, which are sweet with a rich flavour and aroma, sell at high prices. In English-speaking countries such wines would be popularly classified as sauterne.

In New Zealand an insignificant quantity only of hock and sauterne wines is made because of the limited demand and the high degree of skill required in the growing of the grapes and the manufacture of the wines.

Hock is made from a limited range of special varieties of grapes of which the Riesling and its sub-varieties are most important.

A vacuum-operated filling machine. [*Russell Orr photo.*

Very briefly, the manufacturing process consists of crushing and pressing the grapes, clarifying the juice, and fermenting it in large casks. Depending on the maturity of the grapes, little or no sugar is required to be added to the juice.

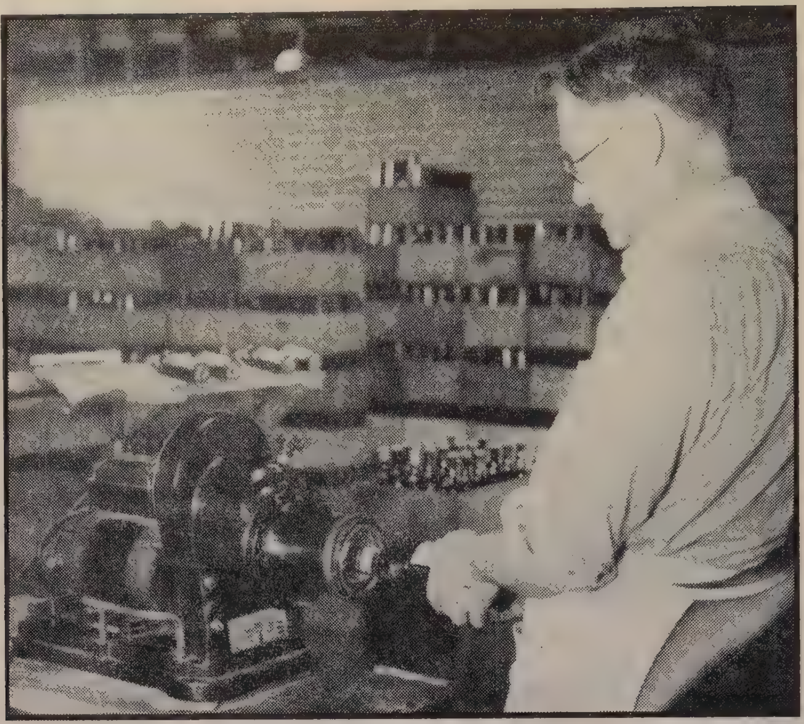
Particular care is necessary in the fermentation stage and in the after care of the finished wine, which because of its delicate nature is very subject to deterioration. In Germany the fermentation is done with selected cultured yeast in glass-lined steel vessels similar to those used in the storage of beer in breweries. Hock wines are bottled young, usually under 12 months, and are matured in the bottle.

Chablis

Chablis is a dry white wine resembling hock, but is somewhat fuller

[*Photo at left by Russell Orr; at right by Sparrow Industrial Pictures Ltd.*

Left—An automatic corking machine. Right—An automatic labelling machine.



A hydraulic capsuling machine. [*Russell Orr photo.*

bodied with a slightly higher alcoholic strength. It is made from the white Pinot grape at the French village of Chablis about 60 miles north-west of the Cote d'Or.

Sauterne

The name sauterne has come into general use as a name for a sweet white wine of moderate alcoholic strength.

It is of French origin, coming from the Sauternes district, situated south-west of Bordeaux. This and the communes of Bommes, Fargues, Preignac, and Barsac are grouped as the Sauternes-Barsac districts.

In English-speaking countries the word barsac is often used as a synonym for sauterne. The most famous sauterne wine comes from the Chateau Yquem. The vines from which these wines are made are mostly Semillon with a proportion of white Sauvignon.

In the Sauternes-Barsac districts the grapes are left on the vines late in the season to attain a higher sugar content. The concentration of the sugar is facilitated by the development of pourriture noble (noble rot), the name commonly given in France to *Botrytis cinerea*, the grey mould which commonly develops on grapes in a wet autumn. The *Botrytis* fungus penetrates the skin and causes the grapes to dry up like raisins. Appreciable amounts of glycerine and a reduction of the acidity of the grape also result from the growth of *Botrytis.*

The natural sugar content of these grapes is so high that they do not completely ferment, and the finished wine varies from slightly sweet to quite sweet, according to the season.

In most other wine-making countries, including New Zealand, a sauterne type of wine is made from a dry white wine sweetened by the addition of grape concentrate or sugar.

Champagne

Fundamentally champagne is a French wine, being a product of the province of Champagne, about 100 miles east of Paris and spread over the three departments of the Aisne, the Marne, and the Aube.

The finest champagne wine is produced in the Marne. The champagne vines produce black and white grapes. It is possible to make champagne from the black grapes by separating the colourless juice from the skins before fermentation. Black and white Pinot and Chardonnay are the principal grape varieties used in the manufacture of champagne.

The making of champagne is an exacting and involved process which makes the wine expensive.

The base wine produced for the making of champagne is a dry, white wine resembling hock and made in the same fashion. When this wine has cleared during its first year it is bottled with a certain amount of sugar to initiate a secondary fermentation and produce the necessary pressure of carbonic acid gas.

As this secondary fermentation occurs in the sealed bottles, the gas produced dissolves in the wine and forms the "mousse" or sparkle. A sediment is also formed in the bottle. The bottled wine is stacked and matured in this condition for many years. Every other year the bottles are restacked to prevent the sediment from setting firmly.

When the wine has matured the sediment must be removed. This is done by standing the bottles neck down on sloping stands called pupitres and subjecting the bottles to a twisting action by hand every day for about 8 to 10 weeks. This works the sediment into the necks of the bottles.

When the sediment has settled on the corks the bottles are disgorged, which means carefully drawing the corks and allowing the gas to eject the sediment.

Skill is necessary to rid the bottles of sediment in this way without losing any undue quantity of wine or allowing the sediment to cloud the wine again.

Sometimes disgorging is assisted by freezing the necks of the bottles, the sediment thus being set into a small ice block which is readily pushed out by the gas.

After the disgorging process the bottles are generally liqueured with a modicum of sugar syrup containing a little brandy and wine, and are then recorked, labelled, and dressed for sale. Champagne may be bottled as brut or dry (no liqueur added) and sec or sweetened.

Champagne is made in most wine-making countries by the same methods as those developed by the French. So far it has not been made in commercial quantities in New Zealand.

CARBONATED WINES

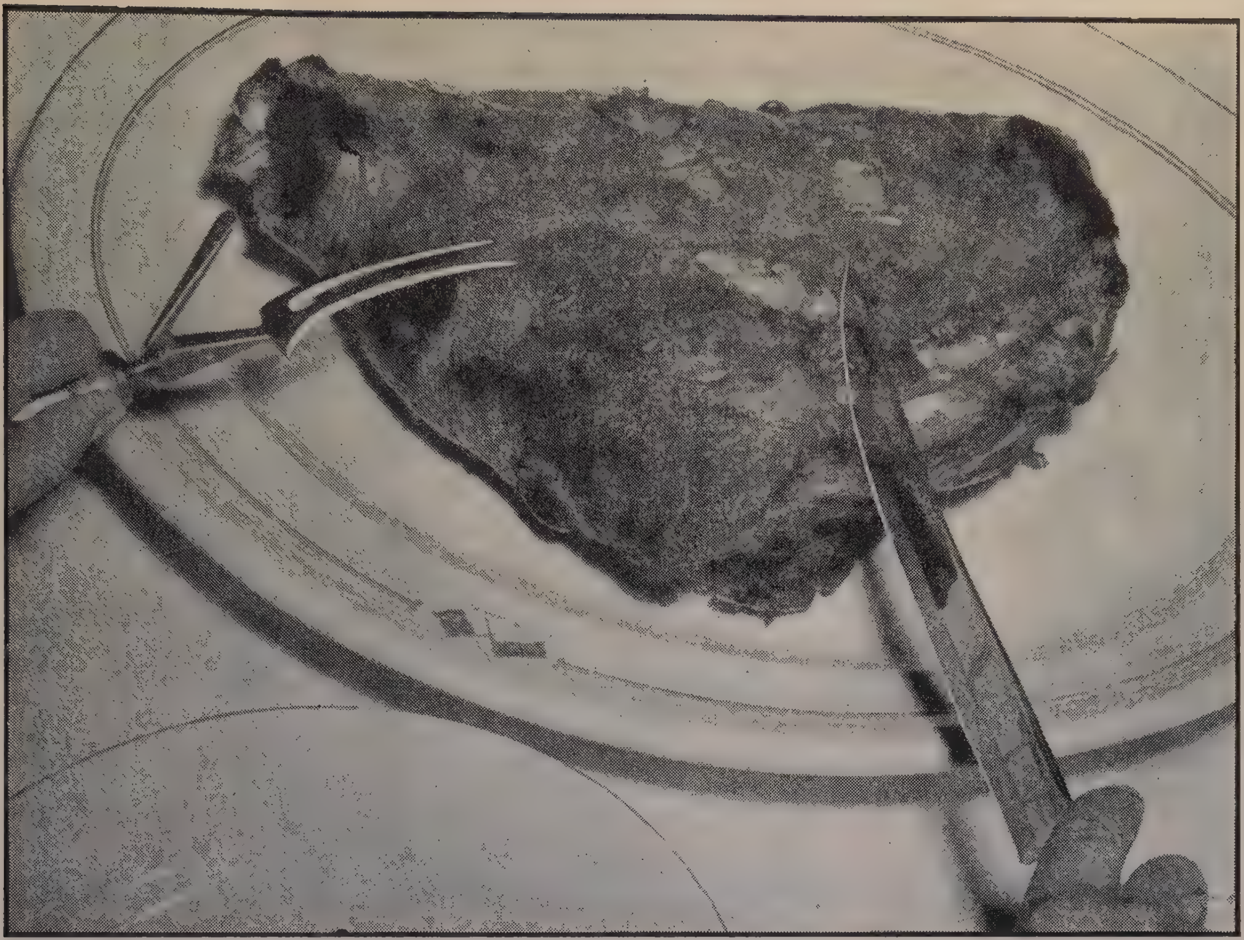
Carbonated wines have been sparkled by being charged with carbonic acid gas artificially instead of by fermentation. Sparkling hock and sparkling burgundy are prepared in this way.

The description of various wines given in this article is by no means complete, but has been limited to the better-known types. Such wines as tarragona, rioja, malaga, lachryma Christi, orvieto, tokay and so on are rarieties in this country, so their detailed description here is hardly warranted.

Wine making in New Zealand is still in its infancy and production is on a very small scale compared with that in other wine-producing countries. Many factors militate against an expansion of wine making here, such as importation of wines, the small population, restricted trade outlets, and unfavourable climatic conditions.

Wine consumption in New Zealand is practically limited to sweet, fortified wines and although quite creditable wines of this type are produced, the climate is better suited to the production of light table wines. As the overwhelming majority of people here prefer sweet, fortified wines, the market does not encourage the production of dry table wines.

New Zealand could win a reputation for making table wines, particularly of the hock and sauterne types. Germany with a more difficult climate has achieved fame for its Rhine and Moselle wines of this type. The writer hopes that some enterprising wine maker will act in this direction and win recognition and perhaps an overseas market for New Zealand wines.



Carving of Meat

CARVING of meat is an art, unfortunately almost a lost art. This is to be regretted, because an expert carver is a pleasure to watch and a feeling of satisfaction results from a successfully completed operation. There is no short cut to proficiency in carving; it requires a long apprenticeship and an elementary knowledge of the anatomy of the joint, bird, or game to be carved. Detailed descriptions of the carving of a shoulder of mutton, a sirloin of beef, and a fowl are given in this article by Maud B. Strain, Field Officer in Rural Sociology, Department of Agriculture, Dunedin.

GOOD carving is desirable for economy. It makes the joint go further, and well-carved meat has a better flavour than that just hacked from the bone in untidy chunks. Nowadays people often prefer to carve from a side table or in the kitchen instead of at the dining table, partly because they may be inexperienced and prefer not to have their efforts watched, and also if a mishap should occur it does not ruin the appearance of the tablecloth. When the meat is carefully carved it not only goes further, but the joint will still be presentable on its second appearance. Adequate skill is developed only by long familiarity with carving; even then the carver must have some co-operation from the cook.

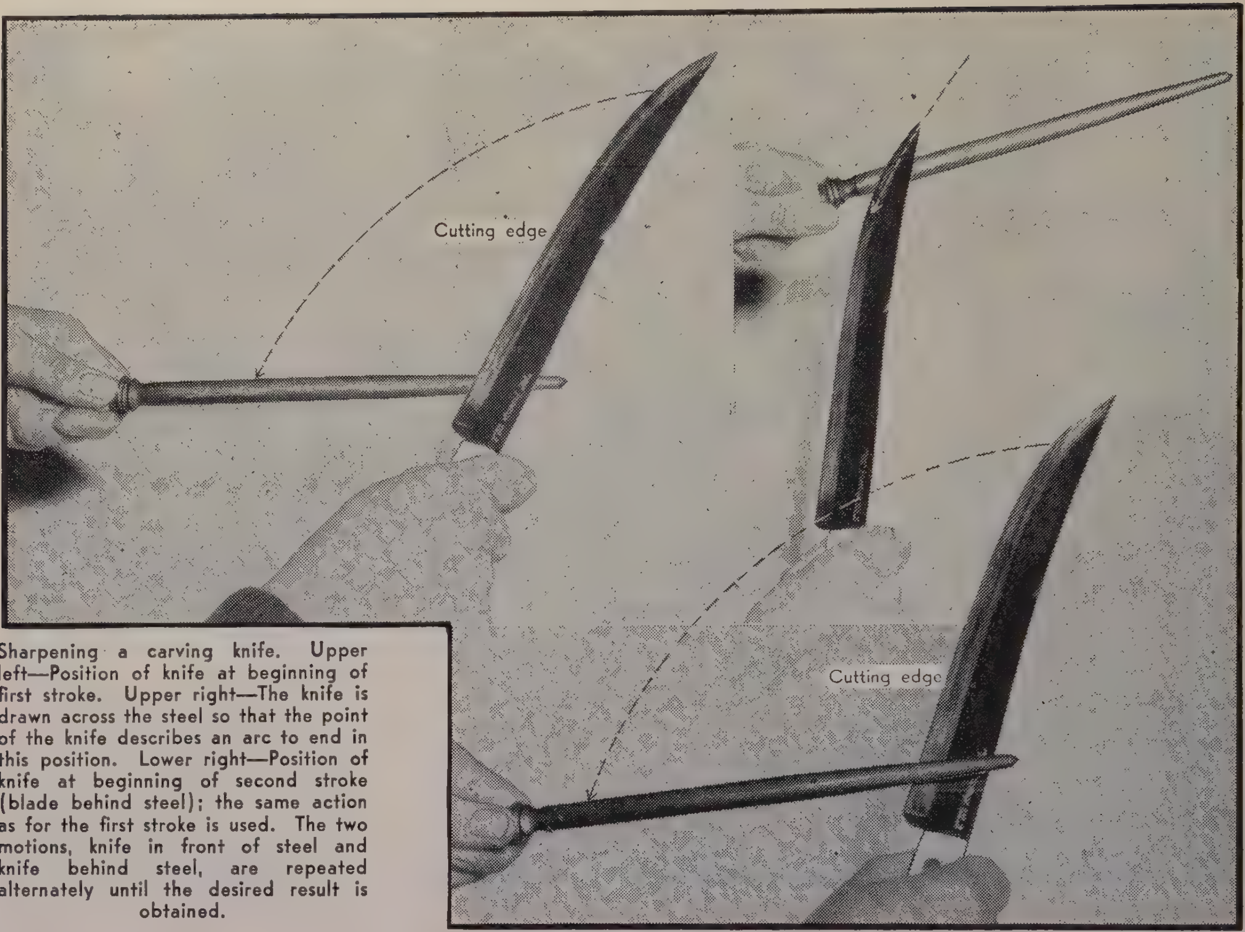
It is necessary to see that the joint is properly prepared before being put in the oven. A badly boned and rolled joint can prove a nightmare to the unfortunate person who has to carve it after it is cooked. If the meat is home killed the housewife herself prepares it for cooking after it has been cut from the carcass. The ribs should be separated from each other at the backbone end. A chopper is the best implement to use for this. If, however, the meat is bought, the butcher will do the preliminary preparation if what is wanted is explained to him at a time when he is not particularly rushed. In lamb, mutton, and pork, the rib joints need to be severed properly so that they may be separated easily during carving. With pork the rind needs to be cut in even channels in line with the joint; in other words, it needs to be well "scored".

It is essential to have the meat dish large enough to take the joint and the cut portions of the meat without overcrowding. Gravy and garnishes should be served separately. The table at which the carving is being done should be firm, as it is most disconcerting to have the table wobble dangerously with every stroke of the knife. It must be remembered that carving cannot be hurried; the carver must be given time to do justice to his art.

Knives

For general carving it is usual to have one carving knife (though it is preferable to have two), a carving fork with a good guard, and a sharpening steel. The carver should make it a rule that the carving knife must not be used for any purposes but carving meat, as it cannot retain a keen cutting edge if used indiscriminately. Further, the knife must be washed separately, dried, and put away separately. This is necessary because a fine edge readily becomes pitted and nicked by coming in contact with other cutlery piled together waiting to be dried. Only if these precautions are taken can a keen cutting edge be maintained.

A good carving knife once found should be regarded as a treasured possession and treated accordingly. It should be resharpened each time before use, preferably not at the dining table. The ideal knife for meat is 10 to 12in. long and about 1in. across. It should be slightly curved toward the point and have a keen edge. Sometimes during carving the knife appears to lose its edge. This is due mostly to the blade expanding with the heat, and explains why it is advisable, if many servings have to be carved, to have a second knife so that knives can be



Sharpening a carving knife. Upper left—Position of knife at beginning of first stroke. Upper right—The knife is drawn across the steel so that the point of the knife describes an arc to end in this position. Lower right—Position of knife at beginning of second stroke (blade behind steel); the same action as for the first stroke is used. The two motions, knife in front of steel and knife behind steel, are repeated alternately until the desired result is obtained.

used alternately, allowing each one to cool properly.

Sharpening

To sharpen a knife is not easy and requires practice. The steel should be held firmly in the left hand and the edge of the knife at the handle end of the blade placed almost flat against the steel. The knife should then be drawn downward with a semicircular movement, first against the front of the steel and then against the back. The movement should be even and rapid. The knife should never be drawn across the steel or placed at an angle against the steel; both these actions will dull the fine edge. It is the properly sharpened knife that cuts, not the carver. The meat should have a smooth surface and not be frayed and unsightly.

Forks

The carving fork should be strong with long tines and a good guard. The guard should be kept up during carving, but every endeavour should be made to prevent the knife from slipping sufficiently to come in contact with the guard, because this blunts the edge.

Meat should always be carved across the grain.

Insert the carving fork in the meat in such a way that it will steady the piece during carving and yet so that the position of the fork need not be changed during the process unless it becomes absolutely necessary. The meat should be cut across the grain in straight, thin, neat slices. The angle of the knife should not be changed after the first cut has been made or slices will be uneven. As carving proceeds the meat should be kept compact, and if it has been carved well, the portion left should not be jagged and rough.

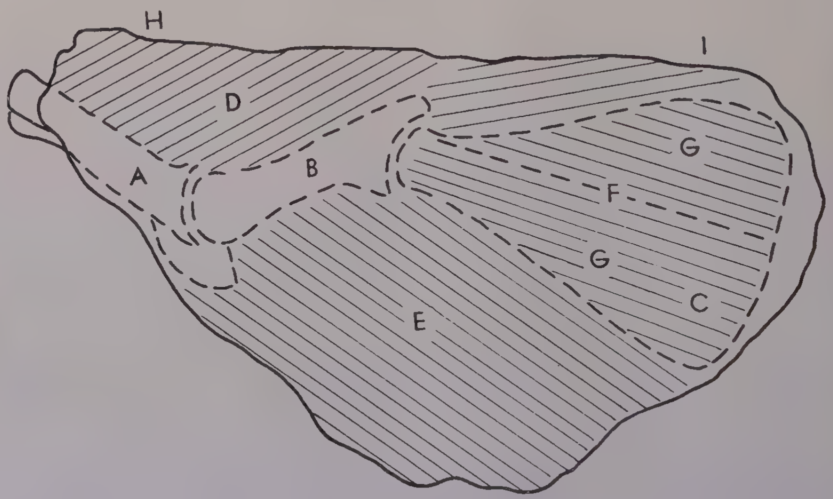


Diagram showing positions of bones in shoulder of mutton. Slices are indicated by the parallel lines.

SHOULDER OF MUTTON

Some joints are more difficult to carve than others. The shoulder of mutton or lamb is a puzzle to many inexperienced carvers, but is a most satisfactory joint when cut up properly. If the joint is to do for 2 days, it is better to serve the under part of the shoulder hot; this will leave a presentable cold joint for next day.

There are three bones to deal with in the shoulder, the knuckle bone (A in diagram), the middle bone (B), and the blade bone (C). The blade bone has a small ridge (F) running along its upper surface, slightly to one side. These bones, apart from portion of the knuckle bone, are not visible till the joint is carved, but it is necessary for the carver to know where they are if he is to carve economically and distribute the lean and fat evenly.

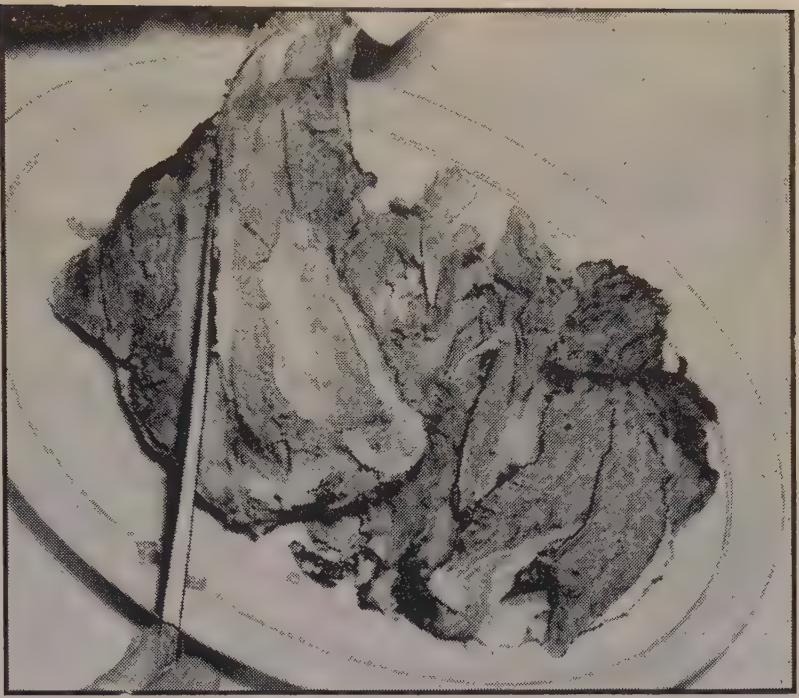
Sometimes with home-killed mutton the shoulder may be left as part of a forequarter, and then there will be ribs to deal with also. These should be separated from each other at the backbone end before cooking. After the joint is cooked the chops should be cut off first and the rest of the joint carved as suggested below.

The shoulder in the diagram is from the left side of the animal and the outside of the shoulder is uppermost.

Carving Directions

Grasp the end of the knuckle bone (A) and turn the joint so that the side HI in the diagram is downward and makes contact with the plate at I. Start carving slices from the meat lying between the middle bone (B) and the blade bone (C), the area E on the diagram. Carve from the outside toward the middle bone, shaping the cuts to reach the curve made by the blade bone. Here the fat and lean are equally divided. When this meat has been removed the joint should be turned so that the broad end of the blade bone (C) is toward the carver; then slices can be cut from either side (G,G) of the ridge (F) of the blade bone. These slices will be shallow but lean and can be served with slices of fat cut from the outside of the shoulder (the area H).

The joint should now be turned over and the lean meat cut from underneath the blade bone. This meat is carved outward with the knife held at a slant. To go with this lean meat slices of fat meat can be cut from the side of the middle bone (the area D). The directions are for a shoulder from the left side; the procedure is similar for a right shoulder except that when the joint is turned so that the side HI is downward, the outside of the shoulder faces the carver instead of the underside.



Carving meat from the upper side of the blade bone of a shoulder of mutton. The rounded end of the blade bone (C in diagram on opposite page) has been turned toward the carver. Slices have been cut from the right side (G in diagram) of the ridge (F in diagram) and are now being cut from G on the left side of F.

First stage of carving sirloin (with bone in). Removing the small bone at the back of the joint.

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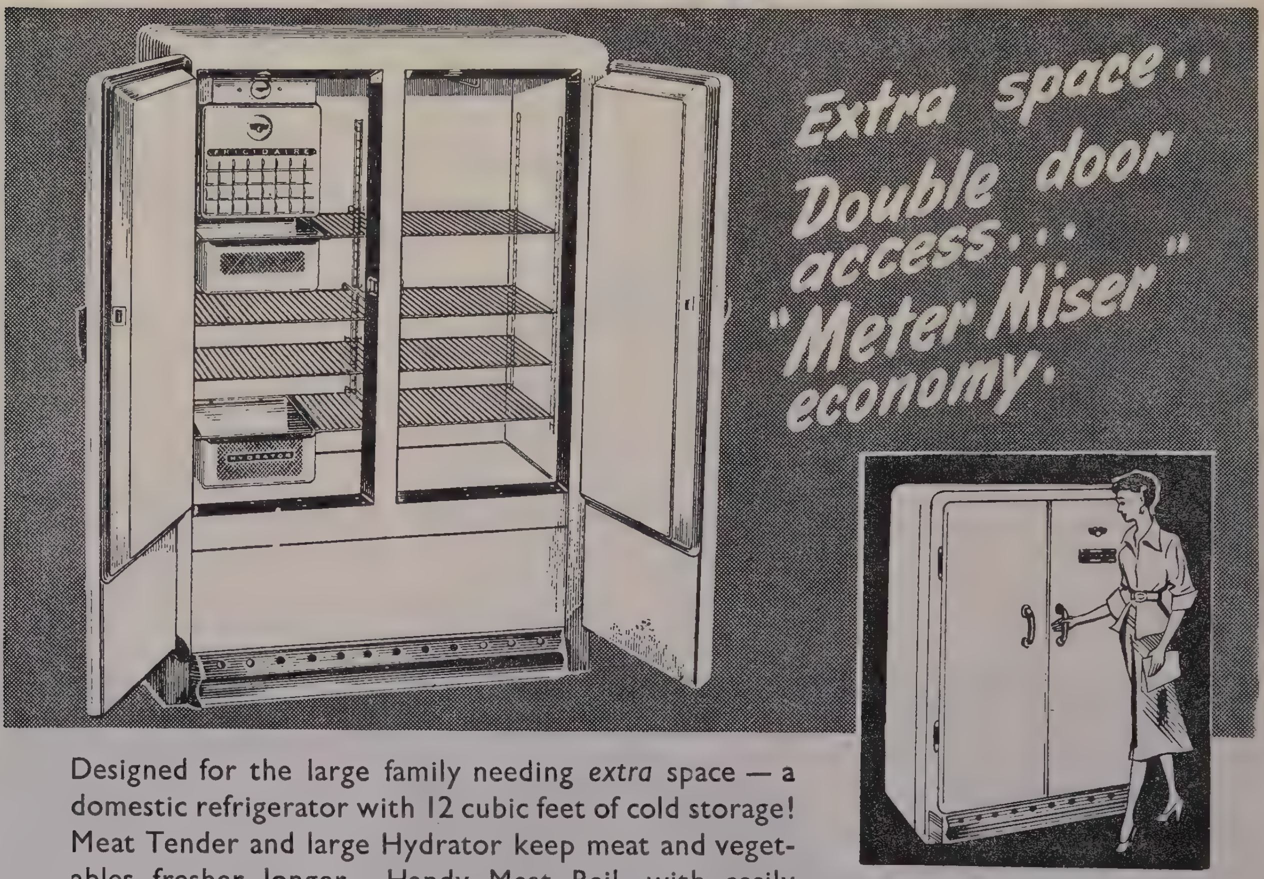

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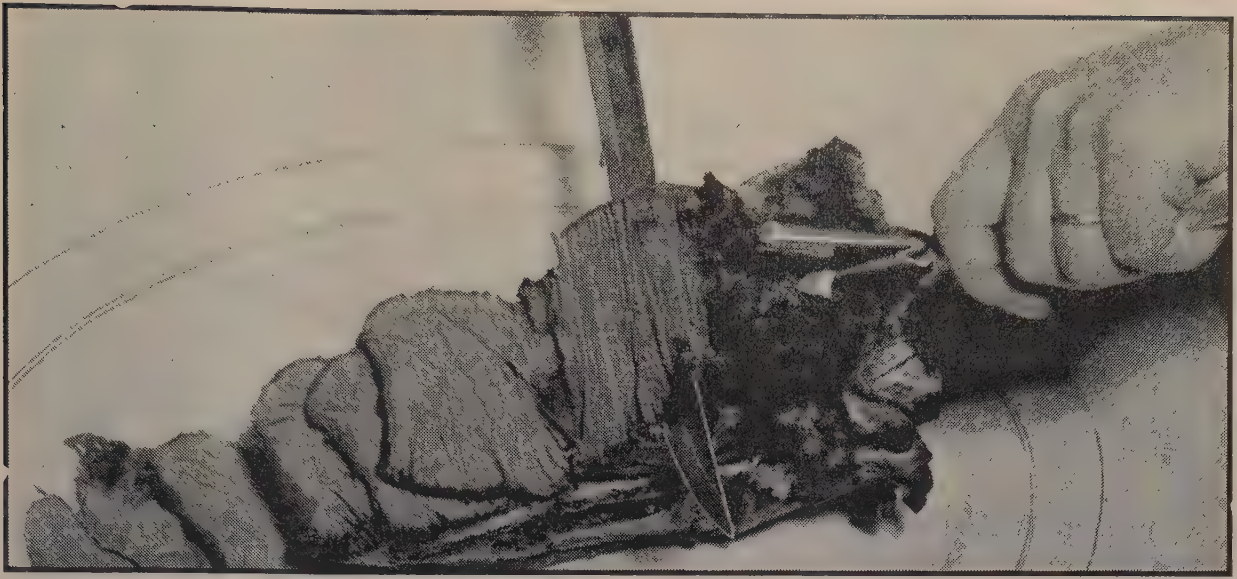


Second stage in carving sirloin. The joint is turned on its back and the undercut carved in slices, the knife being held at a slight slant.

Some carvers may prefer to carve the under side of the blade bone first, the accompanying slices of fat being taken from the outer side of the middle bone. Carving is continued by taking slices from the middle of the joint between the blade bone and middle bone and leaving the top side of the blade bone to be dealt with last.

SIRLOIN OF BEEF

A joint should always be prepared in such a way that, when it is cooked and ready to serve, carving it quickly and in an appetising way is made as straightforward as possible. To achieve this aim it is necessary in the preliminary preparation to remove, or at least saw through, certain bones so that they can easily be detached or divided at the table. For a sirloin of beef the preparation is simple; the backbone is cut through so that it is easily removed before carving. The joint then presents no difficulties; the carving knife cuts straight through to the rib bone below. If the cut is made on a slight slant the edge of the knife will cut against the rib bone at the base at a slight angle, not at right angles, which would tend to blunt the knife.

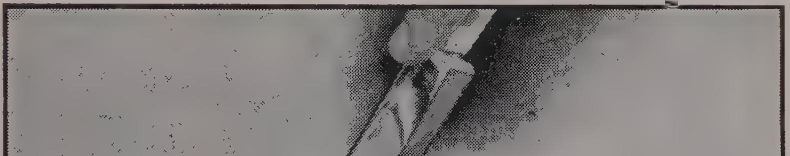
Sirloin consists of the fillet or undercut and the uppercut. The nearer the rump of the carcass the sirloin is taken the more fillet it contains; the rib end has no fillet. Unfortunately near the rump the uppercut tends to be sinewy. so the most satisfactory joint is the middle cut.

Carving Directions

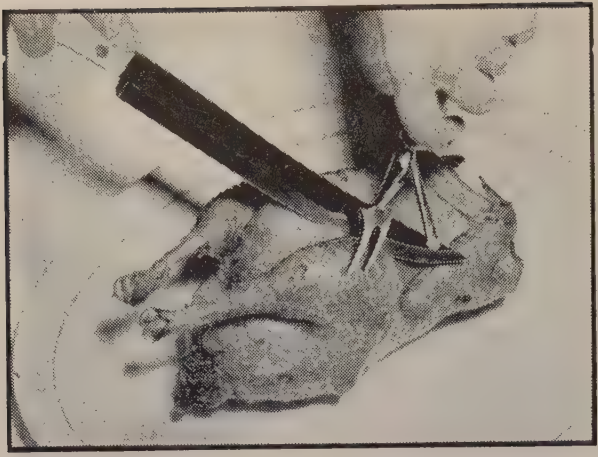
Remove the bone at the back (see illustration on page 275. If there is a good undercut, it should be carved first. To do this turn the joint on its back, remove the fat, then carve the meat across in fairly thin slices, holding the knife on a slight angle. It is usual to serve one or two slices of undercut with each portion cut from the top side of the joint. Undercut slices should be slightly thicker than top slices.

To carve the top turn the joint over again and carve long, thin slices, beginning at the rib end with the knife on a slant as before. In this way the slices can be neatly removed, as the knife can cut right through to the bone at the base of the joint.

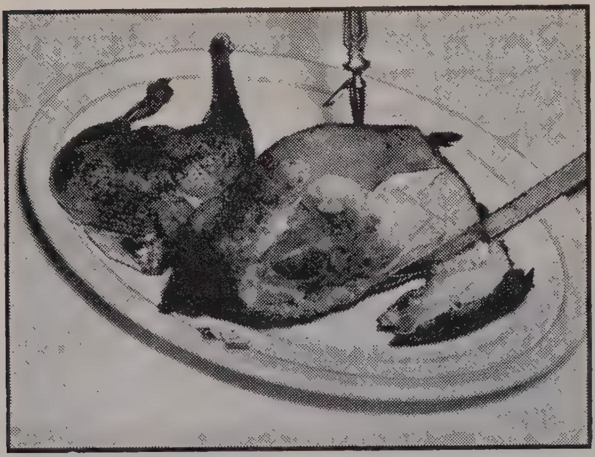
Avoid sticking the fork into the thick part of the meat to steady the joint. With the backbone removed the joint should be firm on the plate and the fork should be free for its proper work, which is to hold the slices of meat being carved and to help with the knife in removing them to the plate.



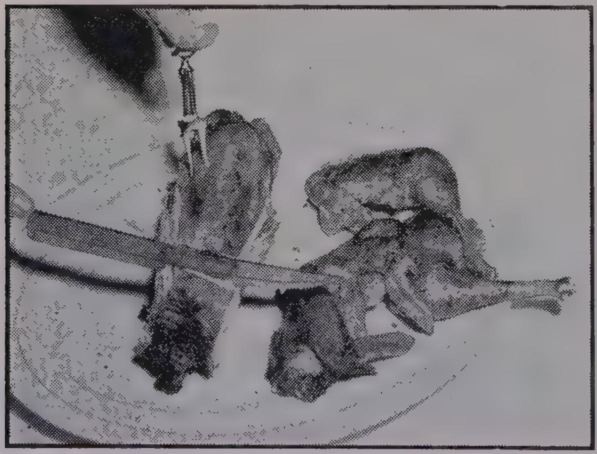
Third stage in carving sirloin. The joint is turned over once more and long, thin slices are carved, beginning at the rib end and with the knife held at a slight slant. The slices are neatly removed as the edge of the knife comes in contact with the base of the joint.



Carving a fowl. The first cut, to remove the legs, taking drumsticks and thigh muscles (line A in diagram).



After removal of the legs the wings are severed (line B in diagram).



When legs and wings have been removed a cut is made across the ridge at the top to remove the wishbone (line D in diagram).

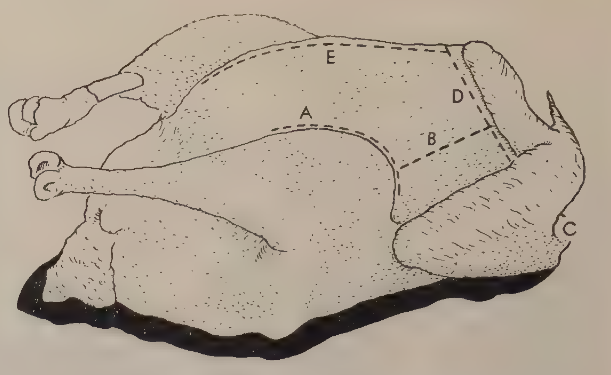
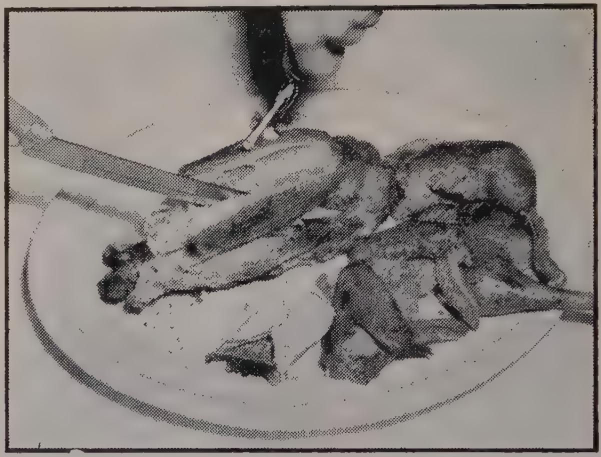


Diagram showing where cuts are made in each stage of the carving of a fowl. A, B, D are lines referred to in captions to illustrations at left and E the line referred to in the caption to the illustration below. C is the point of connection of wing and body.



The point of the knife is run along the top of the breast bone (line E in diagram) to free the meat, and the two pieces of breast meat are removed by easing them away from the bone.

CARVING A FOWL

Begin carving by removing one leg. First the fork should be inserted in the centre of the leg. The skin is then carefully cut round the thigh line, the knife being placed under the thick part of the leg and a cut made toward the feet. When the connecting socket is reached the leg should be bent over and the sinew which holds it to the body of the bird should be severed. The leg should be pulled off with the fork, not cut with the knife.

The knife should then be run along the line of the wing. When the wing joint is reached the fork should be inserted to feel for the position of the connection. The wing should then be severed. When both legs and wings have been removed the point of the knife should be run along the top of the breastbone on either side so that the breast meat may be cut off. Before it can be removed in two pieces the breast bone should be cut across the front. The breast itself should be lifted slightly toward the front and the two pieces of breast meat removed by easing them away from the bone. The meat from the wishbone, which has been cut away from the breast, can be divided into two portions and served with the breast or as one portion.

If the bird is fairly heavy, with plenty of meat on the breast, the number of servings can be increased by dividing each leg at the joint and giving the drumstick with a slice of breast, and the thigh portion with part of the meat from the wishbone. Birds cooked for a family meal are usually stuffed and are often served with bacon or sausages as garnishes. This increases the number of servings.

Spring-flowering Bulbs, Corms, and Tuberous-rooted Plants

SPRING flowers always give a bright and colourful display after the drabness of winter. Because of their perennating nature bulbs, corms, and tuberous-rooted plants form a large percentage of the plants which flower in spring. In this article R. R. White, Horticultural Instructor, Department of Agriculture, Dunedin, discusses some of the aspects in the care and cultivation of these spring-flowering subjects.

MANY gardeners regard the word bulb as covering the whole range of bulbs and corms and in some cases tubers. Definitions of these show that each is different in its structure, and therefore in its method of propagation. All are modified stems.

A bulb consists of a mass of scales tightly rolled in continuous layers to form a solid body or loosely clustered together and fixed to a basal or central core as in lilies. New shoots arise in the axils of these scales. By cutting a narcissus bulb vertically through the centre the arrangement of the scales can be seen, and at the centre itself can be seen the embryo of the next season's flowers.

The tuber is really an underground stem, solid and consisting of a mass of cells. Nourishment is stored in these cells during the resting period and then transferred to the eyes from which the new growth develops. Roots issue from many points on the tuber.

The corm can be said to be an intermediate between the bulb and tuber, incorporating features of both, besides those peculiar to itself. It is an underground stem with a short, fleshy, vertical axis sheathed with dry leaf bases. Buds develop on the upper surface, whereas roots are developed from the base as with bulbs. The corm produces growth which at a certain stage begins to form a new corm which gradually increases in size during the season, but the old corm loses its vitality and gradually withers away.

Propagation

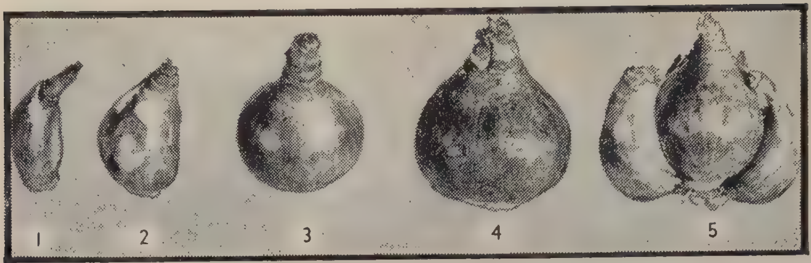
As with all other flowers all bulbs, corms, and tubers, can be propagated from seed, but this method is useful only when a new variety is required. Because of natural increase by division, propagation by this means is easier and is used commercially for the building up of stocks.

With bulbs such as narcissi and tulips offsets are formed. These are

HEADING PHOTOGRAPH: Grand Monarch narcissi used as a border edging.

[Photo News Ltd. photo.

Tulips make excellent bedding subjects when used in masses or combined with smaller bedding plants.



Five grades of narcissi bulbs. 1 and 2—"Offsets". 3—Single round. 4—Double nosed. 5—Mother bulb. Single round produces the best flower.

developments from the buds in the axils of the scales. At the end of the season these are removed as new bulbs. With hyacinths small bulblets are formed around the basal plate. Scooping the base of the bulb after lifting will help to increase the number of small bulblets formed the next season. The bulbs should be placed in storage with good ventilation and a temperature between 70 and 90 degrees F. By autumn the new bulbs will have formed. These are planted still attached to the mother bulb, and after a year are removed and set out separately. Lilies can be propagated by removing some of the scales and transplanting them in the ground or in a box of soil. Small bulblets will form on each scale. Other bulbs are usually propagated by natural division.

Corms are self-propagating. As with gladiolus a new large corm is produced each year and a large number of small corms are found around the base of the large corm. These corms can be planted out and will reach flowering size in one or two seasons. Freesias also reproduce by this means, although they can be raised easily from seed. Cyclamen, which technically are corms, can be divided by cutting or can be raised from seed.

Tuberous-rooted plants can be propagated fairly easily from seed as with anemone and ranunculus. Division of the tubers can be made after the shoots have come away, although with small tubers this is rather difficult.

Narcissi

Narcissi are the most popular of all bulbs, perhaps because of their earliness, hardiness, resistance to disease, and adaptability to a wide range of habitats from parkland to flower pot. All varieties are classified into groups based on characters such as the number of flowers per stem, the length of cup in relation to the perianth or petals, together with cup and perianth colours.

Narcissi are not difficult to cultivate, and can easily be naturalised to fit into many different types of surroundings. Open woodland where trees are widely spaced, slopes, or grassy areas where the grass need not be cut until the foliage has ripened are ideal locations. The foliage must mature, for the bulb is very dependent on this for its next year's growth. Planting is best carried out before the grass is established so that the soil can be worked up well. The areas can then be grassed down after the bulbs are planted. Bulbs can also be planted in established areas by lifting a slab of turf, placing two or three bulbs in the hole dusted with some blood and bone or bone meal and then replacing the turf. The best effect can be obtained by masses of one variety, the best being Poeticus and Triandrus types.

However, like all plants narcissi repsond well to good cultivation, and this is necessary when good flowers are required in the garden. Because they usually remain undisturbed for several years, preparation of the soil before planting should be thorough. The soil should not be too heavy and should be well drained. Old well-rotted farmyard manure or bone meal will furnish food for a long time, and annual topdressings of bone meal are beneficial. Bulbs should be planted as soon as possible after they are received from the nurseryman, as early planting allows them to make good root growth before winter sets in. There should be about 3in. of soil above the bulbs. When the flowers begin to decrease in size it is necessary to lift the bulbs and divide the clumps. They can be replanted immediately or stored in a cool, well-ventilated shed until March.

Some Diseases and Pests of Narcissi

The two most serious pests of narcissi are bulb flies and eelworms. Bulb flies lay their eggs in the bulb necks after the foliage has died off, and the larvae eats down through the centre of the bulb. The larvae is a creamy brown maggot-like grub about ½in. long. Infected bulbs usually have soft necks. Badly damaged bulbs should be destroyed and all others treated. The best treatment is to immerse the bulbs in hot water maintained at 110 degrees F. for an hour. Another method is by fumigating them in a closed box with paradichlorobenzene for 120 hours. Four ounces of the crystals should be used for every cubic foot of space. Hoeing the ground after the bulbs have died down is essential to prevent the adult from laying its eggs.

Tulip virus causes blooms to become striped or broken as shown. Infected plants should be lifted and destroyed.

Eelworms are also troublesome. Symptoms typical of eelworm attack are the formation of lumps on the leaves, and the bulbs themselves may feel soft. If some of the suspected bulbs are cut transversely, discoloured brownish rings show the presence of eelworm. Control can be obtained by hot water treatment for 3 hours at 110 degrees F.

Tulips

Tulip bulbs, which flower later in spring, are always very popular, although their cultivation is not as easy as with narcissi. There are many types available, some early and others later. Their cup-shaped blooms on upright stalks make them good bedding subjects when planted with small plants such as violas, myosotis, and *Bellis perennis*. The best varieties for bedding are those of the Darwin and

The soil should be well cultivated and enriched with well-rotted stable manure or compost. Planting should be done in April to a depth of 4in. with about 6in. between bulbs for a massed effect, or from 12 to 15in. when used with other subjects in the bedding scheme. After flowering, the old flower heads should be removed and the bulbs left until the foliage has begun to die off, when they should be lifted. Diseased bulbs can be sorted out and destroyed and there is less chance of losing a line of bulbs or damaging them with implements during the dormant season if they are lifted each year. After the bulbs are lifted they should be dried off and stored in a well-ventilated shed until the next planting season.
Cottage tvpes.

Diseases of Tulips

A number of diseases cause severe losses among tulips, the most devastating being "fire" (*Botrytis tulipae* (Lib.) Lind.). This disease is evident at all stages of growth. There is no known cure for fire and infected bulbs and foliage should be destroyed by burning. Inspection of the bulbs before planting can be helpful in controlling the disease. Infected bulbs have sclerotia adhering to the outer scales. If the sclerotia are on the outer brown scale only, this should be removed and burnt. Light brown lesions on the white scales show evidence of fire and may carry the disease over. However, dipping the bulbs in a mercury base solution will help control this carry over. The bulbs should be immersed for 20 minutes and allowed to dry before planting or storing. Mercury dips are poisonous, so care should be taken when using them. It is advisable to use a vessel made of wood, glass, or china During growth the tulips should be sprayed with a suitable fungicide and diseased foliage should be removed and the bulb lifted and destroyed.

Grey bulb rot (*Sclerotium tuliparum* kleb) is another serious disease. Infected bulbs do not grow, although shoots are sometimes produced, but these soon die. They should be dug up along with a portion of the soil and destroyed.

"Breaking" is a virus disease fairly common in gardens. Infected plants show the breaking of the colour in the blooms usually as white striping or feathering. Many people regard this as adding beauty to the flower, but it can be very troublesome. As virus is transmitted by aphides, the control measures necessary are the rogueing of infected plants and spraying with nicotine sulphate 1 in 800 or hexaethyl-tetra phosphate 1 in 800. Both require wetting agents. Stored bulbs should be inspected regularly and treated to keep the aphides off them.

Hyacinths

Hyacinths can be used both for outdoor and indoor culture Outdoors they make an excellent subject for bedding either in isolated groups or as one large bed. Their strong upright spikes and sweet scent make them a favourite with most gardeners. They like a rich soil containing plenty of well-rotted humus and should be planted in April to a depth of 4in. to 6in. In areas where frosts are likely to be severe a mulch of straw will help to shelter the bulbs. When flower heads have faded the florets should be stripped off the stem and the bulbs left undisturbed until the foliage has yellowed.

For indoor growing the bulbs can be planted in pots and these should be "plunged" out of doors with a covering of coke breeze or cinders over the pot. When the shoots show through, the pots can be lifted and taken inside. The soil should not be allowed to dry out. After the bulb has flowered the pot can again be plunged outside in a border until the foliage dies off.

Diseases of Hyacinths

The diseases most prevalent with hyacinths are yellow disease and soft rot. Both these bacterial diseases cause a rotting of the bulbs. Before planting, bulbs should be inspected for any rotting and infected ones destroyed. Heavy manuring with nitrogenous compounds should be avoided.

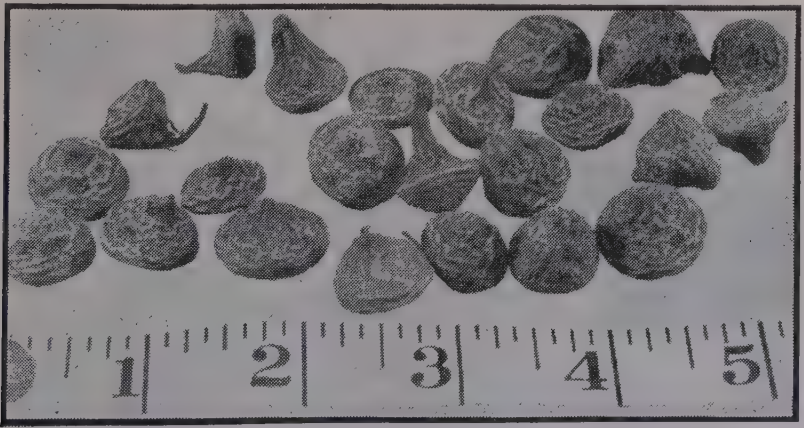
There are numerous smaller bulbs used mainly for edging and in rock gardens. As they can usually be left in the one position for a number of years, a suitable site should be chosen where there will be little disturbance of the bulbs.

Chionodoxa or Glory of the Snow is an early flowering and hardy bulb. The bulbs are very suitable for growing in rose beds as a ground cover or they can be used extensively with snowdrops and scillas. They will thrive in any fertile well-drained soil and like an open situation with both light and moisture during their growing period. They should be planted 3in. deep and 1in. or 2in. apart. Species available are *C. luciliae*, *C. luciliae alba*, *C. rosea*, *C. sardensis*, and *C. gigantea*.

Erythronium is known as Dog's-tooth Violet or Trout Lily, these hardy bulbs are best suited to a shaded location where the soil is well drained. They prefer loose, gritty loam and thrive well when planted close together 2in. to 3in. deep. They rather dislike being transplanted and do not flower well in the first year after planting. As the bulbs tend to dry out, they should not be kept out of the soil any longer than is necessary. *E. dens-canis*, *E. grandiflorum*, and *E. californicum* are popular species. *E. revolutum*, with larger flowers and foliage, prefers heavy soil that is wet during winter.

Fritillaria: These bulbs are best suited for rock gardens or places where they do not have to compete with other plants. *F. imperialis* requires a deep, rich soil and should be planted 6in. deep. *F. meleagris* and *F. aranensis* require a lighter soil, and are best suited for rock gardens. They should be planted as early as possible and if lifted should be replanted immediately, as any drying of the roots is detrimental to the plant.

Ixias are excellent flowers for cutting in late spring.



Anemone tubers planted now will give a good display during late spring.

Galanthus: Snowdrops deserve a place in every garden. They flower early and do best in shady spots underneath shrubs and trees. They like a rich loam including leaf mould. Early April is the best planting time and the depth required is 3in.

Iris: Few irises bloom in spring, but of those that do one of the earliest is *I. reticulata*. It succeeds in most garden soils which are well drained, but is better suited for the rock garden. *I. pavonia*, the Peacock iris, requires good soil and excellent drainage; it does best in rock gardens.

Muscari: Grape hyacinths can be used to best advantage as an edging for borders or as ground cover under shrubs and trees. As they spread rapidly, ample space should be left. *M. botryoides* and *M. botryoides* var. *alba* are those used most widely, but there are a number of other varieties.

Scilla: These hardy bulbs can be used either as an edging or as an informal display. They like a good, well-drained soil, and need not be lifted when once established. *S. siberica* is the best known of the species, and *S. campanulata*, which grows to a height of 18in., is very effective when massed with azaleas.

Spring-flowering corms cover the genera *Crocus*, *Freesia*, and *Ixia*. Crocus is the earliest, and freesias and ixias can be used as pot plants or can be grown outside for late-spring blooms.

Crocus corms like a light soil in full sun, and a well-drained location. They can be used equally well in rock gardens, perennial borders, or with shrub plantings. The corms should be planted 4in. deep and they may be left in the ground indefinitely, except when requiring division. With more than 25 species available the colour

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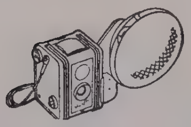

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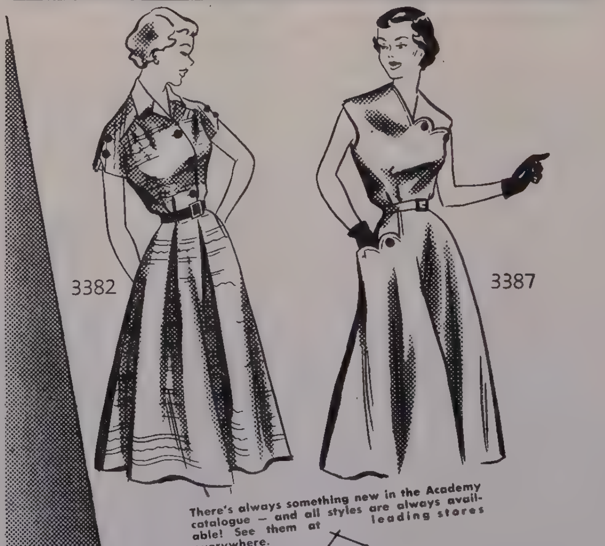

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range varies from purest white through orange-yellow to blue and purple, and effective colouring can be obtained by planting drifts of crocus.

Freesias: These corms do best in pots, as they are not hardy enough to withstand spring frosts out of doors. However, they can be grown outside in the warmer districts. They require an open soil both for pot culture and for outdoor bedding. When the buds appear a weak application of liquid manure is beneficial. The corms may be lifted and stored after the foliage has died off. For outdoor use the corms should be planted 3in. deep in April and mulched with straw during the frosty periods of early spring.

Ixias: These can be treated much the same as freesias, though it is not necessary to lift them each year.

Tuberous-rooted Plants

Of the tuberous-rooted plants the best known are anemone and ranunculus.

Anemones require sheltered positions to prevent them from being cut down by early-spring frosts. They require a rich soil and need to be planted 3in. deep. *A. coronaria* is the later-flowering species, and those required for early-spring flowering are *A. nemorosa, A. robinsoniana, A. apennina, A. blanda,* and *A. hepatica.* The last-named species can be used for planting in rock gardens.

Ranunculus: These flowers give perhaps the most colourful spring display when massed together, and their value as a cut flower is high. The tubers should be planted 6in. apart and 2in. to 3in. deep during April in a rich, open soil. The tubers can be left in the ground after flowering, although they do not flower so well the second time. Plants can easily be raised from seed, although germination is generally rather slow.

[*Douglas Elliott photo.*

Ranunculus gives a bright display of flowers, both in the garden and for indoor use.

Garden Work for April*

Begonias in pots should be dried off gradually by giving them less and less water until the leaves and stems turn yellow. When the plants are quite dormant the pots should be put in a dry, frost-proof place. Fibrous-rooted begonias should be lifted from the borders when autumn frosts cause growth to cease for the year and set closely in boxes and stood in a sheltered frost-free place for winter. The plants can be started into growth next spring and new plants propagated from cuttings.

Bulbs in bowls, potted up and stood out in a cool place to root, should be cleaned up and taken into the house as soon as shoots appear above the soil. They should be put in a cool room at first and watered sparingly. If bowls of bulbs are not given this period of rooting at a low temperature, the leaves start to grow before there is an adequate rooting system to support them and the flowers are not as fine as they should be.

Bulb planting should be concluded in April, except in the warm northern districts, where tulips are better kept in a cool place until May before being planted out. Bulbs should not be left out of the ground too long or they will deteriorate, and bulbs not planted at the proper time cannot be held over until the following season like many sorts or seeds.

Disbudding of **chrysanthemums** should be done as the flower buds develop. Though stems with a single bloom are usually considered best for cutting, there is no need to take off too many buds from plants grown solely for border display. However, it pays to remove a proportion of buds even from border plants, especially the buds growing from the stem below the main flower cluster, and also the side shoots growing from lower down the stems. The extra work involved will be well repaid in improved appearance of the plants when in flower. Chrysanthemums not yet fully staked should be supported at once, as the stems rapidly become top heavy when the flower buds swell. In districts liable to heavy frosts the late varieties of chrysanthemums can now be wrenched, lifted, and carefully replanted in a glasshouse or in a sunny, sheltered place where the blooms can be protected from frosts. Do not pack plants too tightly together or the leaves will be attacked by chrysanthemum mildew. Chrysanthemums growing in pots should be fed regularly with liquid manure.

[*Sparrow Industrial Pictures Ltd photo.*

Gladioli can be lifted and stored when the leaves have turned yellow.

Dahlia roots are tender and are killed by hard frost. In cold districts where the ground is likely to freeze in winter dahlias should be cut down to about 6in. above the ground before the first hard frost and after the plants have finished flowering. Labels should then be tied to the bases of the stems to identify the varieties, and the tubers lifted carefully with a spade and set aside in an airy, frost-free place to dry. When dry the roots should be stored for the winter in a cool shed where they will be safe from frost. In most districts in New Zealand the roots can safely be left in the ground for the winter, but lifting and storing them leaves the ground clear for digging over in winter and avoids the risk of losing the roots in winters which are exceptionally cold or wet.

Fuchsias growing in pots are usually dried off at this time of year, though the soil in the pots should not be allowed to become completely dry. If desired, pot fuchsias can be kept growing all through winter on a sunny windowsill, and often will bear flower buds, though these usually fall off before they open. The plants should be kept drier than during summer and autumn and pruned back hard in spring to start them into growth again and prevent them from becoming too large for use in the house.

Gladioli should continue to be lifted and dried off when the leaves show an obvious change of colour, and plants lifted earlier and now dried off can be prepared for storage by cutting off the leaves an inch or so above the corms and rubbing off the old shrivelled corm. Corms keep better in store if the skins are left on until

---

* This section has been prepared by C. K. Ellis, formerly Horticulturist, Department of Agriculture, Dunedin.

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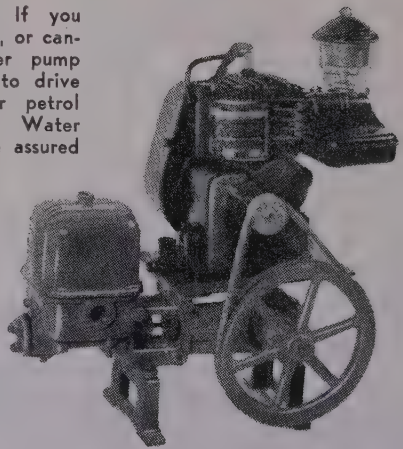


spring. Seedlings sown last month should be kept growing strongly until they each have two leaves, after which they should be watered less and less and gradually dried off.

Herbaceous perennials which have finished flowering should be cut down to within a few inches of the ground, the stubs being left to mark the positions of the roots. Plants which have been in for several years and need dividing can be lifted now, the ground dug over, and well-rooted pieces of the plants replanted. Gaps in the border can be planted up now, making proper use of the perennials scabious, pyrethrums, dephiniums, aquilegias, and phlox, none of which spreads unduly and all of which are worth a place in the mixed border.

Plant out cuttings from the frame as they root and Iceland poppies and other seedlings from the boxes in which they have been grown. Sturdy antirrhinum seedlings found growing in the borders can be transplanted to fill up gaps, and all pansy, viola, Canterbury bell, gaillardia, and hollyhock plants still growing in the frame or nursery bed should be planted into the borders to flower next year.

Pot plants growing in the house should be washed by being held upside down under a cold tap. This washes off pests such as red spider, thrips, and aphides and freshens the plants. Leaves which show small, whitish dots on their upper surfaces or become rusty indicate that red spider mites are feeding on the under sides. The mites can often be seen with the naked eye, moving beneath a thin webbing. Pot plants still growing strongly should be fed regularly with liquid manure or complete fertiliser. Geraniums and balsams which have grown too big to be accommodated on windowsills should be pruned hard, the old leggy growths being removed; new shoots will soon grow from the bases of the plants. If plants are grown in a window where blinds are drawn at night, it is worth while to have the window ledge widened by the addition of a strip of wood so that the pot plants can stand well away from the window and the blinds do not touch the pots when pulled down. If blinds or fringes come into contact with the pots, they absorb moisture that may stain the fabric.

An Apron Quickly Made from Scraps

[*Sparrow Industrial Pictures Ltd. photo.*

THE attractive apron illustrated has been made from scraps left over from the making of a gored frock. Any scraps of sufficient length, though not necessarily of the same colour, can be made into an apron.

Even the ties of the apron illustrated are made from scraps, and the waist band is a piece of bias scrap which matches the bias tape. The seams are joined together with the raw edges on the right side.

The raw edges are then covered with flat bias tape. The sides are bound and the tie ends are finished with the bias tape. The result is a charming apron which is both pretty and useful.

—*MOLLY MACPHERSON, Field Officer in Rural Sociology,*
Department of Agriculture, Auckland

Shrubs which are to be moved and were partly wrenched last month should now be further prepared by wrenching the remainder; that is, the rest of the shrub should be dug round and the remaining roots severed some distance from the trunk. The shrubs, which should not be moved for a further 6 or 8 weeks after being wrenched, will now have little anchorage and should be supported with strong stakes to prevent them from being blown over.

The life of wooden stakes can be prolonged by dipping them in creosote and then into hot tar for the depth to which they will be embedded in the ground, or by treating them with some other good wood preservative. Treated stakes will last for up to 8 years if stacked well off the ground when not in use.

Other Tasks for the Month

Continue thinning annuals sown earlier and pull out annuals and bedding plants which have finished flowering.

Take off all faded and dead flower heads regularly week by week.

Prune hydrangeas in milder districts if that has not been done.

Plants to Propagate

Buds inserted earlier should now be established. Cut the ties before the swelling stems cause them to bite into the bark.

Cuttings of many perennial plants such as geraniums, hybrid wallflowers, catmint, and marguerites will still root if put in cold frames. Viola cuttings may also be taken, using only young, strong shoots. This is the season to start taking hard-wood cuttings of shrubs, each 6 to 10in. long, with the lower leaves of evergreen species removed. Among the many shrubs easy to propagate in this way are *Lonicera nitida*, escallonia, privet, and flowering currant. (A hard-wood cutting is one in which the whole stem is woody to the tip.) The cuttings should be inserted firmly in the soil with about half their lengths buried.

Lift, divide, and replant pinks, double daisies, and herbaceous perennials which have finished flowering.

Plant out cinerarias (in a semi-shady place), Iceland poppies, forget-me-nots, wallflowers, and other bedding plants that will make a showy display in spring. Planting should be done as soon as the summer bedding plants and annuals have been removed; this gives the new plants the benefit of the warmth which is still in the soil. If planting is delayed, the plants have less chance to become well established before the cold weather sets in.

Sow a further batch of annuals for early flowering in the warm northern districts, where most of the hardy annuals will grow steadily all through winter.

◆

Banana Passion Fruit

BANANA passion fruit, one of the less common sub-tropical fruits, grows well in mild climates. The fruit is long and oval and when ripe is golden yellow. Two main varieties are grown, the red-flowered *Passiflora van volxemii*, which begins to ripen in late February or early March, and the pink-flowered *Passiflora mollissima*, which begins to ripen in late March or early April. The vines continue to bear fruit until September or October and this fruit is a useful addition to the available fresh fruit during winter. In this article by Nell Macpherson, Field Officer in Rural Sociology, Department of Agriculture, Auckland, recipes are given for using the fruit in various ways.

THE banana passion fruit is similar to the common passion fruit in that only the pulp is eaten. The pulp has a delicate, slightly astringent flavour when raw, and this flavour is developed in cooking.

Raw Fruit Recipes

The pulp may be eaten unsweetened or it may be mixed with equal quantities of sugar and served as an accompaniment to junket or custard. It is delicious when folded into sweetened whipped cream.

Banana Passion Fruit Cream

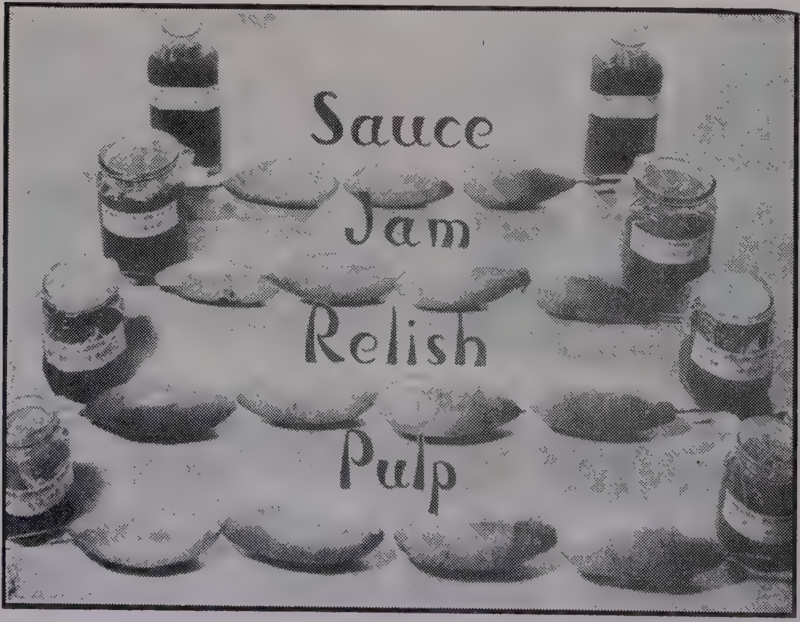
1 cup of passion fruit pulp
½ cup of sugar
1 cup of whipped and sweetened cream

Mix the sugar with the passion fruit pulp and allow the mixture to stand while the cream is being whipped. Gradually fold the sweetened pulp into the whipped cream. Use as a filling for cakes or as a dessert.

Banana Passion Fruit and Pineapple Salad

9 passion fruit
¾ cup of sugar
6 slices of tinned pineapple

Remove the pulp from the passion fruit and mix it with the sugar. Pile the mixture into a serving dish. Cut the pineapple slices in sixths and arrange them round the edge of the bowl. Pour the pineapple juice over all. (6 servings.)



Cooked Pulp Recipes

Banana Passion Fruit Pie

8in. cooked shell of short pastry
Pulp of 4 passion fruit
½ cup of sugar
½ cup of water
1½ tablespoons of cornflour

Heat the passion fruit pulp, sugar, and water and simmer them for 5 minutes. Mix the cornflour to a thin paste with a little cold water. Add the hot mixture to this and mix thoroughly. Return to the heat and bring to the boil, stirring all the time until thick and clear. Pour into the pie shell and serve either hot or cold. (6 servings.)

Meringue Pie

Pulp of 6 passion fruit
2 eggs
1 cup of sugar
1½ cups of milk
3 tablespoons of cornflour
½ tablespoon of butter
¼ teaspoon of salt
8in. short-pastry shell

Boil the passion fruit pulp with ½ cup of the sugar for 5 minutes and sieve the mixture. Heat the milk, butter, salt, cornflour, and egg yolks and stir until the mixture just begins to thicken. Gradually add the fruit pulp, stirring to prevent curdling. Set aside to cool slightly. Heat the pastry shell in a moderate oven (375 degrees F.). Beat the egg whites with a pinch of salt until stiff. Beat in the remaining ½ cup of sugar. Spoon the egg mixture into the pastry shell and pile the meringue on top. Brown the meringue in a moderate oven (375 degrees F.) for about 10 minutes. (6 servings.)

Banana Passion Fruit Cream

4 passion fruit
2 eggs
½ cup of sugar
½ cup of water
1 tablespoon of cornflour
2 tablespoons of milk

Take the pulp from the fruits, add the sugar and water to the pulp, and cook gently for 5 minutes. Mix the egg yolks and cornflour with the milk and add the hot mixture to it. Return to the heat and cook until thick. Cool slightly and fold in the stiffly beaten egg whites. Pile in separate dishes. (6 servings.)

A Variation

Set a lime jelly in a ring mould. Unmould it on a serving dish. Allow the passion fruit cream to cool thoroughly and pile it into and around the ring mould. (6 to 8 servings.)

Preserves

Banana Passion Fruit Jam

1lb. of passion fruit pulp
1lb. of sugar
Juice of 2 lemons

Boil the pulp and lemon juice until the mixture is soft. Strain the pulp and sieve it to remove the seeds. Return to the heat and add the sugar, stirring until it is dissolved; then boil hard, stirring constantly until the jam gives the setting test.

Banana Passion Fruit Sauce

1lb. of passion fruit
1lb. of apples
½lb. of onion
1 pint of vinegar
2lb. of brown sugar
1 teaspoon of mace
¼ teaspoon of cayenne
½ teaspoon of pepper
1 tablespoon of salt
1 teaspoon of allspice

Cut up the passion fruit and apples and peel and slice the onion. Put them in a saucepan and add the vinegar. Bring to the boil, boil for 15 minutes, and mash with a masher. Add the remaining ingredients and boil for a further 20 minutes. Strain the sauce through a colander or coarse strainer. Return to the heat and boil for 5 minutes. Thicken if necessary with a little flour. The sauce must be boiled for 5 minutes after the flour is added.

Pour the sauce into sterilised bottles and allow to cool. Pour melted paraffin wax over the sauce and cover or cork the bottles.

Banana Passion Fruit Relish

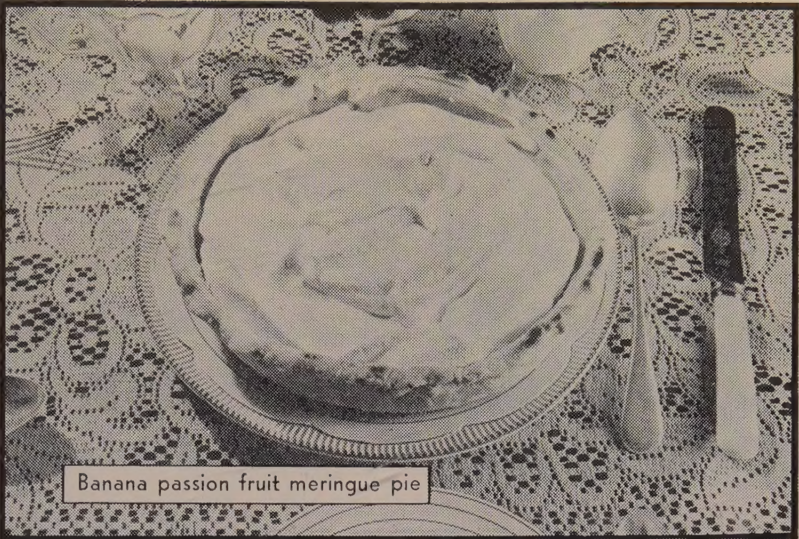
1lb. of passion fruit pulp
½ teaspoon of mustard
¼ teaspoon of ginger
½ teaspoon of curry powder
1½ cups of vinegar
Pinch of cayenne pepper
1 small onion, chopped
1 tablespoon of salt
4oz. of sultanas
8oz. of brown sugar

Boil the passion fruit pulp, sultanas, onion, and vinegar for 1 hour. Add the remaining ingredients and boil the relish for a further 15 minutes. Pour it into hot, sterilised jars and allow it to get cold. Cover with melted paraffin wax and transparent cellulose covers.

Banana Passion Fruit Pulp

Mix 1 cup of banana passion fruit pulp and 1 cup of sugar and bring to the boil. Boil for 10 minutes. Pour into sterilised jars and cover as for jam. This preserve is excellent for topping ice cream or for icing and flavouring.

All photographs by Sparrow Industrial Pictures Ltd.


Banana passion fruit meringue pie

Banana passion fruit and pineapple salad

Banana passion fruit cream

Double Bedjacket

THE attractive bedjacket illustrated is lacy in appearance, but is extra warm because of the inner lining, knitted in the same pattern but in a different colour.

MATERIALS: 4oz. of 2-ply wool in pink, 4oz. of 2-ply wool in blue, 2 No. 9 and 2 No. 7 knitting needles, a crochet hook, and 1yd. of ribbon.

Measurements: Length, 17in.; bust, 36in.

Tension: 6 st. to 1in. over lace patt. on No. 9 needles; 6 st. to 1in. over st. st. on No. 7 needles.

Abbreviations: K. knit, p. purl, st. stitch(es), tog. together, rep. repeat, patt. pattern, cont. continue, sl. slip, p.s.s.o. pass slip stitch over, beg. beginning, w.o.n. wool over needle, w.r.n. wool round needle, wl. fwd. wool forward, inc. increase, dec. decrease, st. st. stocking stitch (1 row k., 1 row p.).

Using No. 9 needles and pink wool cast on 224 st. and work in patt. thus:—

First row: K. 1, wl. fwd., k. 11, * k. 2 tog., wl. fwd., sl. 1, k. 1, p.s.s.o., k. 10. Rep. from * to last 2 st., k. 1, wl. fwd., k. 1.

Second row: K. 1, k. 1 into back of loop, * w.r.n., p. 2 tog., p. 8, p. 2 tog., w.o.n., k. twice into next loop (by working into the front and back of the st.). Rep. from * to last st., ending last rep. k. 1 into back of loop instead of k. twice into loop, k. 1.

Third row: K. 1, * k. 2, wl. fwd., sl. 1, k. 1, p.s.s.o., k. 6, k. 2 tog., wl. fwd., k. 2. Rep. from * to last st., k. 1.

Fourth row: K. 1, * p. 3, w.r.n., p. 2 tog., p. 4, p. 2 tog., w.r.n., p. 3. Rep. from * to last st., k. 1.

Fifth row: K 1, * k. 4, wl. fwd., sl. 1, k. 1, p.s.s.o., k. 2, k. 2 tog., wl. fwd., k. 4. Rep. from * to last st., k. 1.

Sixth row: K. 1, * w.r.n., p. 2 tog., p. 3, w.r.n., (p. 2 tog.) twice, w.r.n., p. 3, p. 2 tog. Rep. from * to last st., w.o.n., k. 1.

Seventh row: K. 2, * k. 4, k. 2 tog., wl. fwd., sl. 1, k. 1, p.s.s.o., k. 4, k. twice into next loop. Rep. from * to last st., ending last rep. with k. 1 into back of loop instead of k. twice into next loop, k. 1.

Eighth row: K. 1, * p. 4, p. 2 tog., w.o.n., k. twice into next loop, w.r.n., p. 2 tog., p. 4. Rep. from * to last st., k. 1.

Ninth row: K. 1, * k. 3, k. 2 tog., wl. fwd., k. 4, wl. fwd., sl. 1, k. 1, p.s.s.o., k. 3. Rep. from * to last st., k. 1.

Tenth row: K. 1, * p. 2, p. 2 tog., w.r.n., p. 6, w.r.n., p. 2 tog., p. 2. Rep. from * to last st., k. 1.

Eleventh row: K. 1, * k. 1, k. 2 tog., wl. fwd., k. 8, wl. fwd., sl. 1, k. 1, p.s.s.o., k. 1. Rep. from * to last st., k. 1.

Twelfth row: K. 1, * p. 2 tog., w.r.n., p. 3, p. 2 tog., w.r.n., p. 2 tog., p. 3, w.r.n., p. 2 tog. Rep. from * to last st., k. 1.

Thirteenth row: K. 1, * wl. fwd., sl. 1, k. 1, p.s.s.o., k. 4, k. twice into next loop, k. 4, k. 2 tog. Rep. from * to last st., wl. fwd., k. 1.

The last 12 rows, that is, rows 2 to 13 (inclusive) form the patt. Cont. in patt. until work measures about 9in. ending with a fourth patt. row.

Divide for back and fronts thus: Next row: Patt. 54, cast off 6, patt. 104, cast off 6, patt. 54. Work on this second set of 54 st. only, dec. 1 st. at armhole edge on every row until 43 st. remain. Cont. on these st. until work measures 15in., ending at straight front edge.

Shape neck: Cast off 14 st. at beg. of next row, then cont. straight on remaining st. until work measures 17in., ending at armhole edge.

Shape shoulder: Next row: Cast off 7, patt. to end. Next row: Patt. to end. Rep. last 2 rows twice more. Cast off. Rejoin wool to the 106 st. and work in patt., dec. 1 st. at both ends of every row until 84 st. remain. Cont. on these st. until work measures 17in.

Shape shoulders: Next row: Cast off 7 at beg. of next 6 rows, then 8 st. at beg. of next 2 rows. Cast off. Rejoin wool to remaining 54 st. and work to match first side.

Sleeves: Using No. 9 needles and pink wool cast on 84 st. and work in patt. as given for main part for 14in.

Shape top: Dec. 1 st. at both ends of alternate rows until 62 st. remain, then dec. 1 st. at both ends of every row until 26 st. remain. Cast off 3 st. at beg. of next 4 rows. Cast off.

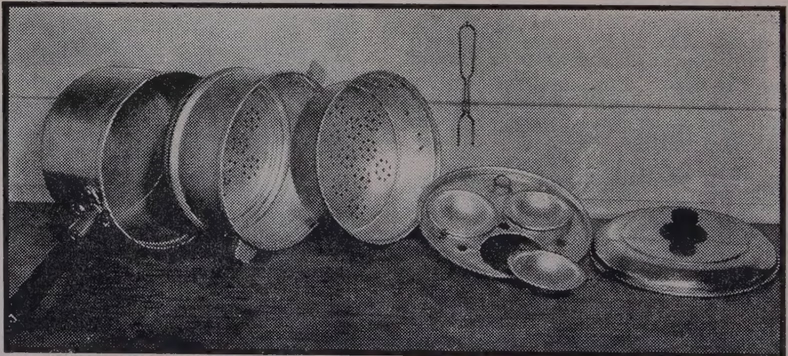
Lining: Work as given for main part, but use No. 7 needles and blue wool and work in st. st. instead of patt.

Make up: Press work lightly on wrong side, using a warm iron and a damp cloth. Join shoulder and sleeve seams of each part. Put blue lining inside pink coat, st. st. side showing. Work a row of double crochet in pink, joining the two together all round outside edges. Into this work a shell edging thus: 1 single crochet into first double crochet * miss 1 double crochet, 5 double treble into next double crochet, miss 1 double crochet, 1 single crochet into next double crochet. Rep. from * all round. Thread ribbon through edging at neck.

"Cookies that will Keep"

A necessary ingredient for the making of coconut crisps, for which a recipe was given in the article "Cookies that will Keep" in the January issue of the "Journal", was omitted from the list of ingredients. The recipe, which was set out on page 81 of the issue, should have contained the ingredient "4oz. of butter melted".

Saucepan Which Does Not Boil Over



[*Sparrow Industrial Pictures Ltd. photo.*

THE saucepan illustrated is made of aluminium and has a heat-proof handle, and because of its specially shaped rim, does not boil over. Other pieces are a deep steamer, a shallow steamer, and an egg poacher which is useful for heating small quantities of baby food. These separate parts can all be used at the same time. The deep steamer has handles for lifting and the shallow steamer has a fork attachment for lifting. There is also an aluminium bowl for use alone or as a double boiler with the pot.

—MOLLY MACPHERSON, Field Officer in Rural Sociology,
Department of Agriculture, Auckland

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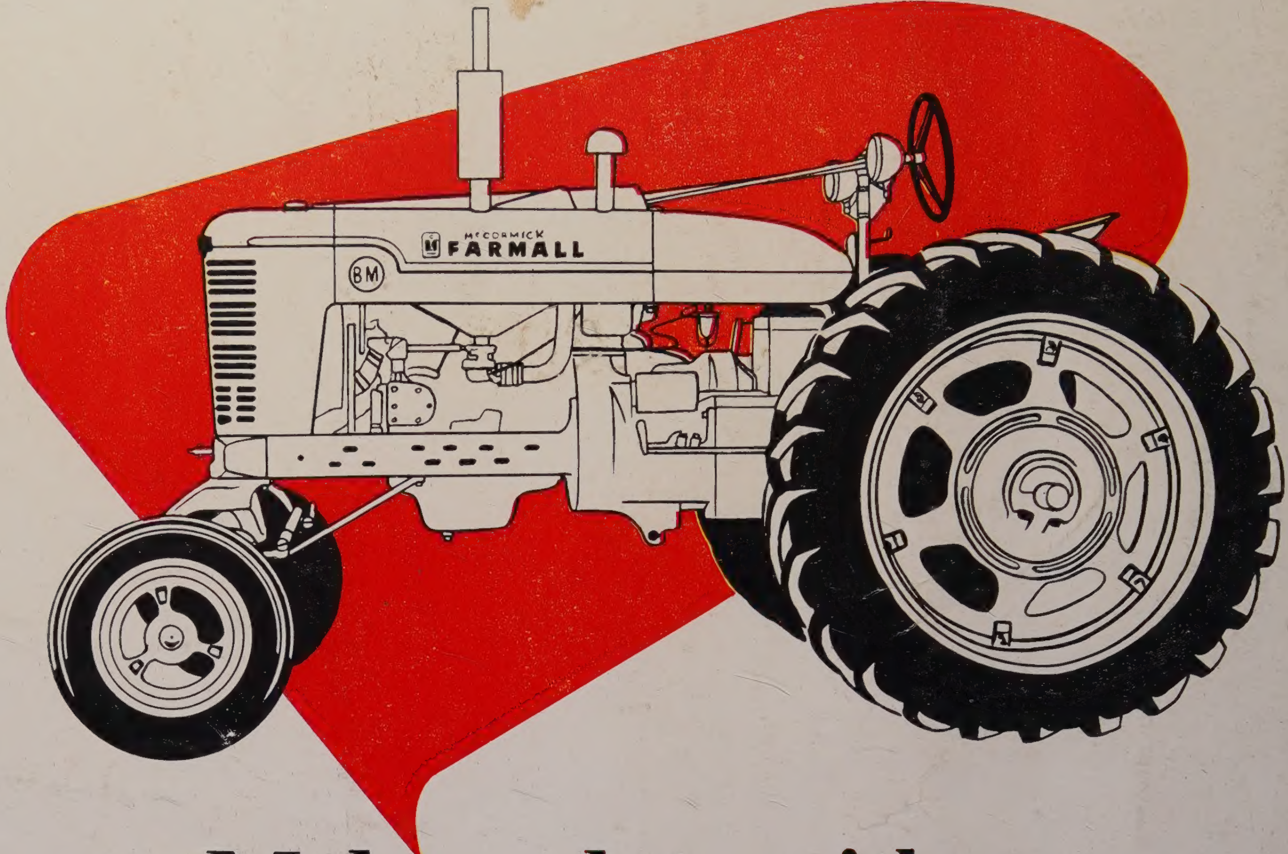

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